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BIRD-BANDING

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BREEDING ACTIVITIES OF LONG-TAILED JAEGER, HERRING GULL AND ARCTIC TERN ON BYLOT ISLAND, NORTHWEST TERRITORIES, CANADA*

By WILLIAM H. DRURY, JR.

INTRODUCTION

The 1954 Bylot Island Expedition spent from June 12 to July 29 at the mouth of the Aktineq River on southern Bylot Island—approximately 73° North Latitude and 79° West Longitude—District of Franklin, Northwest Territories, Canada (map in Miller, 1955).

A short description of the trip has been published in *The Bulletin* of the Massachusetts Audubon Society (1955), and descriptions of the area and faunal lists will be published (Van Tyne and Drury, 1959).

This paper reports on observations of breeding Arctic Terns and of early stages of the breeding cycle of Long-tailed Jaeger and Herring Gull.

The accompanying map (Figure 1) shows details of the topography of the area and the location of the nests of Arctic Terns.

LONG-TAILED JAEGER

Stercorarius longicaudus Vieillot. (Eskimo: Ishunga).

Migration and Arrival

On our arrival we found Long-tailed Jaegers both at Pond Inlet (June 11) and on Bylot (June 12). Between June 12 and 25, flocks of six to 15 birds flew in steadily, and usually silently, from over the ice on Eclipse Sound; they continued inland, flying out of sight to the north. In our study area during June and July, we saw groups of ten to 15 birds flying over the uplands, the mouth of the Aktineq River, and the lead in the sea ice. They often uttered a *cooo-eeeep* cry.

Habitat

Jaegers had territorial perches on exposed hummocks, mounds, or rocks, from which there were wide views of the uplands. We found three territories in the study area: on the east slope of West Ridge, near Kungo Hill; on the highest point of West Ridge; and on a knob west of Iceberg Lake. There was a fourth on a ridge west of the study area. These perch sites are shown on the plate of nests in a paper on Bylot passerines (Drury, 1960), to be published in this journal.

*Contribution from the Hatheway School of Conservation Education No. 14.

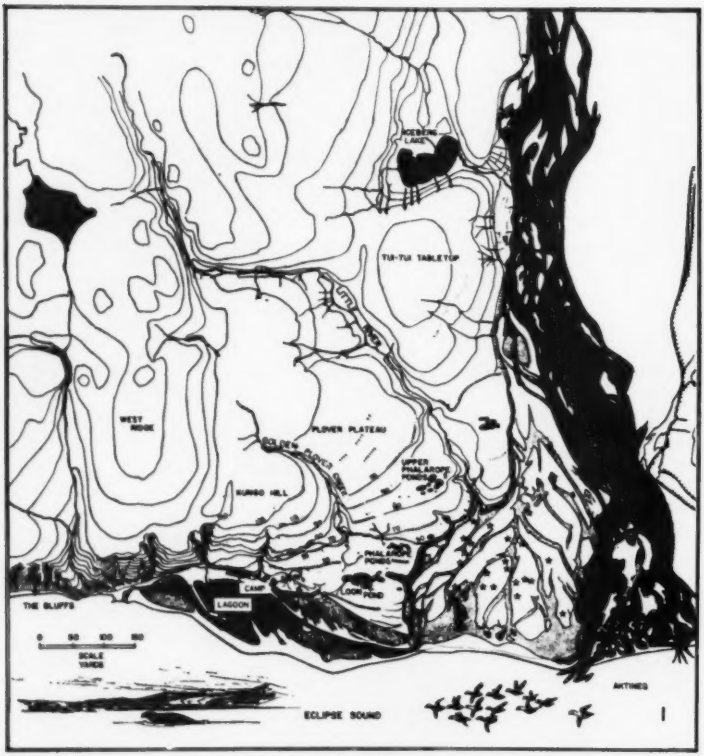

Figure 1. FIELD MAP OF THE STUDY AREA AT THE MOUTH OF THE AKTINEQ RIVER—SOUTHERN BYLOT ISLAND. Topography is indicated approximately by contours which tend to follow raised beach levels. The contour lines were not accurately established or followed. They are used to indicate topography. The nests of Arctic Terns are shown.

We saw five pairs established on territories on July 21 during a walk north from our study area to the tongue of the Aktineq Glacier. D. V. Ellis says that in 1955 (June 15-16), a Long-tailed Jaeger seemed to have a nest on a spot which, by his description, we judge to be on the 70-foot beach about 100 yards directly north of our camp.

Territory

We first saw territorial behavior June 30, when the snow had left the upland slopes. Jaegers took up perches morning and evening between 0600 and 0900, and between 1700 and 2100.

Aggressive Behavior and Pair Formation

In Flight

Territorial advertisement was a slow flight in circuits, with very deep, slow wingbeats (Figure 2), accompanied by cries of *weep*, *reeu*, or by a long, rattling mew—*krrrreeeeeuu*. The short cries were less common and seemed to be of lower intensity. We heard the long, rattling mew also when two or three birds were flying together in normal flight. The cry was directed at human as well as jaeger intruders and is presumably aggressive. Another cry, uttered during aerial displays and pursuit flights, and never heard from solitary birds, was a short and sharp, rolling *rio-rik* or *rig-rig-rig*. These calls are similar to calls described for hostile situations in Skua *(Catharacta skua)* and Parasitic Jaeger *(Stercorarius parasiticus)* by Selous (1901), Perry (1948), Williamson (1950-53), and Stonehouse (1956).

A pursuit flight was the most common display. Two or three jaegers flew together slowly over the uplands; then one suddenly started vigorously pursuing another, rapidly and erratically zigzagging, swooping, towering, and darting. The chases ended as abruptly as they began, the two birds suddenly swooping apart, and then flying along parallel to each other.

The display flights and flights accompanied by the long, rattling mew call were correlated with warm sunshine and absence of strong breeze. Displays were most frequent in mid-morning, 0900-1100, and mid-afternoon, 1400-1700.

On the Ground

Behavior was of two types: (a) head-wagging; and (b) movements simulating take-off. Head-wagging consisted of one bird or two together, standing very straight with the tail horizontal, stretching the neck upward as far as possible and wagging the head from side to side (see Figure 2—anxiety posture). One bird often stood facing the other, with its head over the other's back; or as often, the two birds stood parallel. In simulated flight movements, one bird extended its neck forward and upward and stretched its partly opened wings and tail stiffly upward. Then it lowered its head stiffly and beat its wings strongly two or three times, sometimes rising a few feet, sometimes remaining on the ground. After several "false starts" of this sort, the bird often flew off with slow, deep wingbeats. Sometimes the other birds followed, but if not, the flying bird usually returned after a short flight and settled again, stretching its neck, jerking its head from side to side, and calling *weeou* or *rig-rig-rig*. The other birds of the group usually stood very straight with neck stretched, and wagged the head. Head-wagging also often preceded the deep-wingstroke flight.

Solitary jaegers were often seen standing or sitting quietly on the ground and usually uttered a short, yelping mew cry when approached by a flying jaeger or by one of our party. When a single bird settled near another bird or a pair, stretching and head-wagging took place. If one or more jaegers entered another's territory, the holder of the territory pursued the trespassers briefly, giving the long, rattling mew cry. Jaegers on neighboring perches, apparently stimulated by the

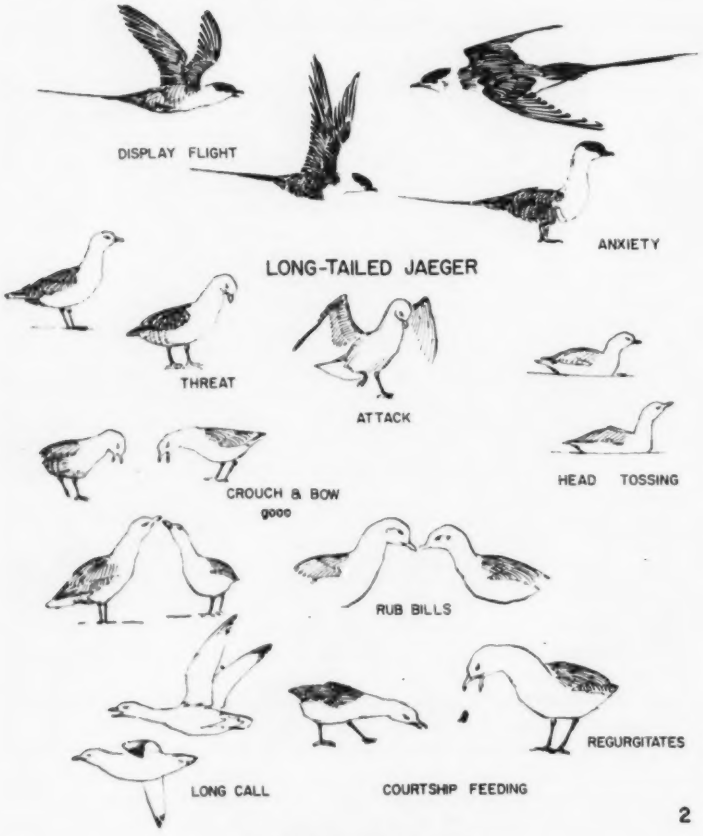

Figure 2. LONG-TAILED JAEGER AND HERRING GULL DISPLAYS.

disturbance, also started the cry. As Sutton (1932) pointed out, groups of these jaegers spent much of their time standing or sitting silently on the ground. On several occasions our approach seemed to incite them to start a ground display.

An upright posture is associated with wing-spreading in the Skua (Selous, 1901; Stonehouse, 1956; etc.) which gives a short, sharp call at the same time. It is classified as an aggressive posture or, in the old terminology, a greeting ceremony (Armstrong, 1947). The long call of gulls, which is also aggressive, is presumably represented here by the long, rattling mew.

The head-wagging suggests similar actions described in the hooded gulls *(Larus ridibundus, atricilla)* by Tinbergen and Moynihan (1952) and Moynihan (1955). If it is an appeasement action, it may be a

part of sex recognition or contribute to the more general function of pair formation.

Stonehouse (1956) comments on the absence of a social alarm call in the Skua, and suggests it may reflect social rather than colonial nesting. The yelping call [similar to the call of a Bar-tailed Godwit *(Limosa lapponica)*] given in the presence of a human intruder, is also given in the presence of jaeger and Peregrine *(Falco peregrinus)* intruders (see below).

Nests and Eggs

Mewing and pursuit flights centered around the knobs, but we found no nests on Bylot. Our rounds to check nests may have displaced two of the jaeger pairs. We saw no jaegers in immature plumage. Idlouk and his daughter Leah, two of our Eskimo companions (Drurys, 1955), said that nest sites are on open tundra slopes with a wide view of the surroundings. The Rosins (Drurys, 1955) found a Long-tailed Jaeger nest with two eggs at Pond Inlet, about June 28. They described it as well built, unlike most Long-tailed Jaeger nests reported in the literature and the ones I have seen in Finnish Lapland. The adults showed great concern, flying and mewing overhead, but did not attack.

Reaction to Intruders

One Long-tailed Jaeger, engaged with two others in an aerial display, left them and pursued and attacked a Peregrine that flew past. The jaeger dove vigorously at the Peregrine four times, calling a yelping *kirooa* again and again, sometimes adding *keeeow-keeeow*. The Peregrine flew steadily on, but rolled on its side, showing its "fists" at the last moment, each time the jaeger dove, and the jaeger swerved off without striking. The Peregrine did not alter course or speed, and the jaeger finally gave up the pursuit.

Feeding

The 1954 season on southern Bylot was one of minimum lemming numbers. The jaegers, like other predators, were forced to find other food. (On June 24, an emaciated jaeger, bearing no sign of having been injured, was found dead in the slush at the edge of the lagoon.) From six to ten jaegers could usually be seen over the leads in the ice, or over the open water at the river mouth, feeding on the debris at the ice edge. They flew slowly or hovered low over the water, dipping and picking at the floating trash as do Laughing Gulls *(Larus atricilla)* and Bonaparte's Gulls *(Larus philadelphia)*, and taking advantage of the strong and steady wind which made flight relatively effortless.

Once we saw a jaeger pursue an immature Glaucous Gull *(Larus hyperboreus)* until the gull regurgitated a large black mass which the jaeger seized and devoured on the ice. On only two occasions did we see jaegers chasing Arctic Terns *(Sterna paradisea)*.

On June 30, during a trip from Pond Inlet to Bylot, the Rosins saw Long-tailed Jaegers diving from a height and going under water for crackers thrown to them. One jaeger was seized and pulled under by

a Ringed Seal *(Phoca hispida)*, but soon afterward the bird bobbed to the surface and flew off, apparently unharmed.

On June 25 a Long-tailed Jaeger chased a Lapland Longspur *(Calcarius lapponicus)*. The jaeger floated and hovered in the strong wind, gliding down at the longspur in seemingly idle pursuit. For twelve minutes, buffeted by the wind, the longspur flew back and forth across the then dry bed of Little River and up a small creek, its flights becoming shorter and shorter while the jaeger swooped closer and closer, only to rise, hover, and dive again. Finally the longspur dove into the rocks in the dry bed of the river. During the final five minutes another jaeger, which had floated down the valley of the Little River, hovered about thirty yards from the scene but did not join the pursuit. When the longspur disappeared into the rocks, the jaeger fluttered and hovered over the spot for four minutes; then it flew west up Little River, by which time the second jaeger had also drifted westward over Plover Plateau.

From the way the eggs in two Oldsquaw *(Clangula hyemalis)* nests (July 10 and 29) were punctured with a nearly square hole, and the dead young left trampled into the down, Idlouk judged that jaegers, which constantly worked back and forth across these slopes, were responsible for the destruction of both. Perhaps our regular visits exposed these nests to hazards greater than usual.

Herring Gull

Larus argentatus thayeri W. S. Brooks. (Eskimo: Kooksee *or* Nowyah Kooksee).

We saw "Thayer's" Gulls on our arrival and regularly in small numbers (all adults) throughout our stay; six (on June 18) were the maximum seen. They scavenged in small patches of melt-water, but ignored the scraps thrown out for them.

Aggressive Behavior and Pair Formation

We observed displays on June 16-19 among the group of gulls that loitered at the outlet of the lagoon. We watched the birds daily, and I believe this flock was a "club" (Tinbergen, 1953) and that we saw the events leading to pair formation. It was clear that some pairs had already formed. We frequently heard the "call note" which is a low-intensity "long call" (Tinbergen, 1953; Moynihan, 1955).

On June 28, two gulls flew eastward over the outer beach. The leading bird was in normal flight, but the pursuer held its neck stretched far forward, screamed *keeyou keeyou* continually, and beat its wings slowly and more deeply than ordinarily (Figure 2). This was presumably the "trumpeting call" or "long call" given in flight (Deusing, 1939; Tinbergen, 1953). Moynihan (1956) suggests that the aerial long call expresses especially high hostility in the "call note-long call-aerial long call" series.

In a mutual display (Figure 2), first one and then the other of a pair frequently uttered either a wheezy *ngoo* (Tinbergen's food-begging cry) rapidly repeated four to six times, or a slow *koo-luk* (Tinbergen's mew call) slowly repeated about three times. While uttering the calls, the pair bowed slightly, bending their legs, the head pointed straight

downward, the throat distended, and the bill wide open. Then one called *an-oh*, and both straightened up and looked around with necks stretched and heads horizontal. This "choking" (Tinbergen, 1953) is a mutual display usually associated either with nest site or pair formation. Following this, while one continued to give the food-begging call, the other of the pair fluffed out its neck feathers and stretched the neck upward while pointing the head straight downward, as if resting the chin on the breast. Once, after such a preliminary, the gull raised its "wrists" over its back, half spread its wings, and ran at a Glaucous Gull that was about five yards away. This display has been called "upright threat" by Tinbergen (1953). The Glaucous Gull ignored the whole procedure, and the Thayer's Gull merely stopped and looked around. The wings of the threatening and attacking gull seem to have been unusually widely spread for this posture.

On June 17, a mutual food-begging ceremony (Figure 2) took place between two birds while they were sitting on the water. First one gull, then the other, raised its head from the normal position until the bill was pointing upward to an angle of about 45°. An hour later, at the same place, a pair stretched their necks up and forward, heads and bills extended in line. Their bills crossed but did not touch. Then both lowered and wagged their heads, pointing their bills down, then rubbed their bills together. This cocking of the bill, looking downward and touching the other's bill, has been described by Tinbergen as another part of "food-begging." The action lasted for seven minutes; then one bird, with distended neck, regurgitated onto the ice after four attempts, and the other at once ate the food. The displaying bird stopped for 15 minutes, then started again, at the neck-stretching stage, and carried through to another regurgitation. This behavior is like that described by Tinbergen as (a) involved in pair formation in the clubs, and (b) as preliminary to copulation.

Two days later, June 19, the gulls left the lagoon, which is what we would expect according to Tinbergen's sequence. The paired gulls left to select a nesting territory. The actions described above include all the various ones Tinbergen says occur in the clubs during pair formation: (1) food-begging and head-tossing by the female; (2) threat and redirected aggression by the male; (3) mew call and choking (4) food regurgitation; and (5) mutual food-begging (Moynihan, 1955 summary).

We found no differences in the actions of these birds when compared with the actions already described for other populations of Herring Gulls.

ARCTIC TERN

Sterna paradisaea Pontoppidan. (Eskimo: Emokotáilok).
Sterna macrura Naum. of European authors.

Migration and Arrival

We saw the first Arctic Terns (20) at 0200 on July 3, over the gravel wash at the mouth of the Aktineq, where nests were later found. This date is so late that it seemed like a second nesting, but it is un-

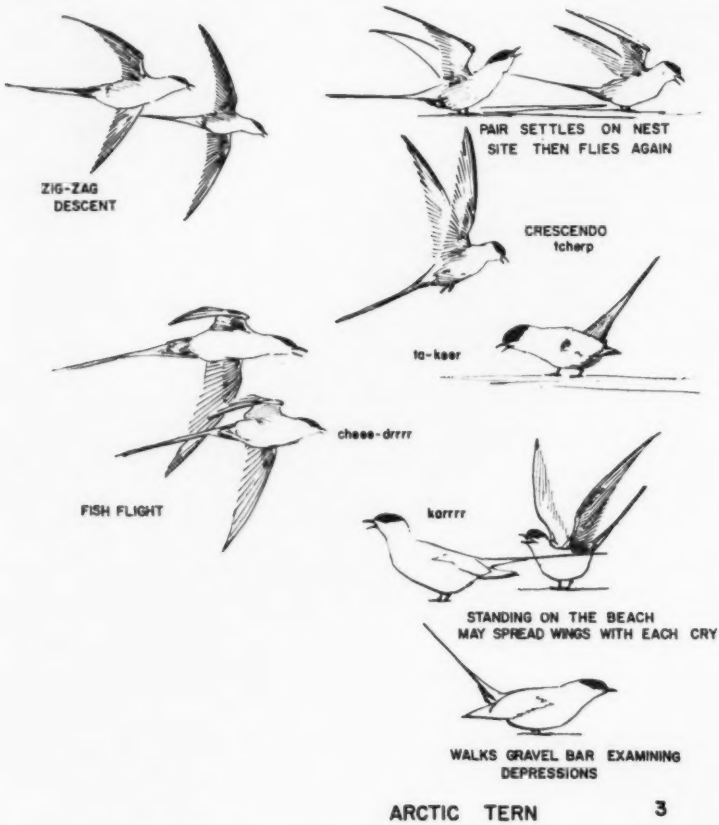

Figure 3. ARCTIC TERN DISPLAYS.

likely that a colony in its second laying would show the conspicuous expression of the early courtship displays we recorded (see Discussion).

We saw no terns on the nesting area when we visited it at least four times between June 14 and June 28. The party returning from Pond Inlet on June 28 saw three or four terns over the leads in the sea ice. We saw a flock of 32 birds roosting on the ice off the Aktineq on July 8.

Our observations agree with those of others for Common Tern *(Sterna hirundo)*, Tinbergen (1931), and Dircksen (1932) for Arctic Tern, that after arrival in the colony area the birds spend several night roosting away from the colony. They visit the site very early in the morning but do not alight and soon "forget" their sexual intentions and return in a cloud to feed at sea (Tinbergen, 1931).

Aggressive Behavior and Pair Formation

In Flight

When we first saw the flock on July 3, the birds were flying singly and in pairs, many in the slow-willowy flight that precedes the "fish flight (Figure 3). They were crying *peée drŕr*, the second note lower and hoarser. During this flight there was an exaggerated rise and fall of the body between wingbeats. Repeatedly during these flights, some birds gave a *psip* call, singly or rapidly repeated. We could not see whether these birds were the ones in the flight or the others milling around over the same area. The flights took place over the gravel wash, where nests were later found, and also over the gravel ridge of one of the outer beaches in front of our camp. The notes are distinctly higher and more musical than the equivalent notes of Common Terns. Other notes given at this time were a *tcherp* (like the Roseate Tern, *Sterna dougallii)*, given very frequently, and a rapid *chrr-chrr-chrr* (compare Tinbergen, 1931—*Korr-korrkorr-krrkrr* given in the fish flight when the head is pointed down—*Beugestellung)*.

It must be remembered that most of the authors cited, such as Tinbergen and Palmer, were working with Common Terns, while our studies were of Arctic Terns. Differences are to be expected, but the similarities are conspicuous.

On July 4 there was a marked increase in the tendency for the willowy flights to be carried out by pairs, and the cries of the terns were slightly different. The two birds cried *tchik tchik* but did so slighty "out of prase," so that the effect was *ta-chik ta-chik ta-chik* or *ta-kéer ta-kéer ta-kéer*. A *tip tip tip* call in rapid succession was also common. The birds were most active over the lower part of the gravel near the sea and at the mouth of the river, rather than over the nesting area proper. A total of 32 terns took part. None was recorded as actually carrying a fish in the symbolic "fish flight." Tinbergen (1931) suggested that the fish was indeed subsidiary in this flight display, and the action "self-exhausting"—functioning to develop a bond between the pair. Communal displays were last seen July 11.

On the Ground

When a flying bird approached one that was perched on the ground, the latter cocked its tail, pointed its head down and spread its wings slightly (Figure 3), *Beugestellung* (bent posture) of Tinbergen (1931).

Sex Recognition

Occasionally the terns were seen to return to the ground and take part in the phase of courtship that is said to precede sex recognition in Common Terns (Tinbergen, 1938; Palmer, 1941). That is, after the course of a "fish flight" they set wings in "V" and glided to the ground, crying *tcherp* in crescendo and diminuendo, then sat with their wings held over their backs, still calling *ta-kéer*. The bird held its head either with bill raised *(Reckstellung*, stretch posture), or with bill pointed straight down in the bent posture. They cocked the tail up in both postures (Figure 3). Moynihan (1955) suggests tentatively that the *ta-kéer* given in this and other aggressive situations is related to the long call of gulls.

At the end of such a performance, the birds held their wings high over their backs and stood for a short time, often flying off and repeating the procedure. Tinbergen suggested that in the later stages of the communal fish-flight display in Common Terns, a territorial male will only fly in the bent posture (head down), and try to lead each partner to land at his territorial site where he continues the threatening bent posture. Palmer points out that in Common Terns the male is carrying a fish in this posture on the ground and the female approaches and tries to slip past him and steal the fish. The male threatens and pecks her and she assumes the stretch posture at once. He follows suit. A male leaves the site in response to the threats. The female's begging increases and eventually she takes the fish. The male then begs to the female, but still threatens. Numerous repetitions of such visits by a female lead to pair formation.

In our observations later at Aktineq, and July 14 at Ooyarashukjooeet, one bird on the ground stood with head down and tail cocked up, calling *ta-kéer*, as another approached in flight also calling it and lit next to "him," holding wings and bill high, then slowly folded wings and lowered bill (Figure 3). We saw birds call on the ground, with head up and wings raised, and with head up and wings folded, as well as head down in these postures. Sometimes after such a flight, or when they had been standing together, one walked past the other, calling *kree-kree* and then *ta-kéer*, sometimes with head bowed, wings slightly strutting, and tail sharply cocked up. We saw no snatching, offering of fish, or exchange of fish, and so have no comment on Dircksen's suggestion that offering of fish leads to begging by the female and is a step toward copulation.

Palmer (1941) brings together information in English on courtship displays of Common Terns. His information of course does not cover studies of the last 18 years, but Michael Cullen has been carrying on an extensive study of the courtship of Arctic Terns in England, and the publication of his thesis will bring the material up to date. I think that the discussion whether the fish-flight is a step toward copulation or is self-exhausting pair formation action, as Tinbergen suggested, is resolved by recent studies in bird behavior such as those by Moynihan (1955). Whether the action "looks forward" to copulation, or to feeding the incubating bird and chicks, seems to me to be an academic question. It seems to me that the discussion in Southern (1938) confuses proximate and ultimate causes.

Nest and Eggs

Nesting Sites

Twenty tern nests were found on the higher ridges of the wash at the mouth of the Aktineq. The closest nests were about 15 to 20 yards apart, but most were no closer than 35 yards apart, and some were as much as 75 yards from the nearest nest. The diameter of the nesting area was more than half a mile (Figure 1—nests black stars). These nests are much farther apart than the "rough circle about six feet in diameter" for Common Terns (O. L. Austin, Jr., 1929).

All the nests were placed in similar situations. They were not in the coarse cobbles, nor in fine sand patches, but in small sandy

Figure 4. ARCTIC TERN NEST. A few pebbles were brought into the scrape which is closely associated with a clump of the perennial Purple Saxifrage *(Saxifraga oppositifolia)*.

patches in a generally pebbly area. (Pebbles: one-half to two and one-half inches in diameter.) The sandy patches formed natural depressions in which a "scrape" was made. Usually some pebbles or tiny bits of wood were added to the sides of the nest, and all nests were within six to 12 inches of a clump of plants (Figure 4). The species of plant apparently made no difference; the most common plant (Broad-leaved Fireweed, *Epilobium latifolium* L.) was most frequently used, and the other plants appeared roughly in the order of their frequency of occurrence.

Plants grew in patches of fine-grained sand in the cobbles, so it is hard to say that the patch of plants was selected as such; but the patch of vegetation may be the stimulus given by the environment, while I presume that the feature selected in evolution of this population is the nesting on the highest parts of the gravel—those least subject to flooding by flash floods. Of course the places where clumps of plants persist coincide with those which have remained free of flooding for the longest time, and, presumably, are less likely to be flooded. O. L. Austin, Jr. (1932) has shown that Common and Roseate Terns do take definite regard for patterns of grass in their nest sites, so that the use of vegetation suggested here is not unreasonable.

I am surprised that students of Larid behavior have, even in their comparative studies, almost completely omitted reference to the studies of Common Terns by O. L. Austin, Jr. and R. S. Palmer.

Egg Laying

The first eggs were found July 14. One nest contained one egg, and two nests contained two eggs each. By July 18 we had found

13 nests, of which nine contained two eggs. From this we conclude that most egg-laying took place between July 11 and July 18.

Clutch Size

Of the total of 18 nests for which we have a report of the contents, eight contained one egg, and ten nests contained two. Clutch size averaged 1.55. Pettingill (1939) reported 144 eggs in 100 nests, and Hawksley (1957) reported 308 eggs in 225 nests. Both studies were made on Machias Seal Island, Maine. These gave an average clutch size of 1.4, which indicates that clutches of one egg are not aberrant even in the southern part of the range, and also that there is negligible clutch size variations with latitude between Maine and Bylot Island. In contrast, Lack (1948) reported average clutch size are 2.25 in middle Europe; Bickerton (1909) reported 1.7 in 209 nests in Britain; and Eklund (1944) reported 1.7 in 279 nests from Greenland. Hawksley (1957) could find no significant differences in clutch size between early and late nests, but in the "less severe" weather of 1948, the clutch size was 1.73 in contrast to 1.19 in 1947. Thus annual variation encompasses latitudinal variation.

Activities During Incubation

Our observations agree with Tinbergen's (1931) and Palmer's (1941) that the gliding flight, which they suggest is a continuation of the fish flight (Figure 3), continues into incubation. Such flights were seen at Aktineq and at Ooyarashukjooeet. In the course of a gliding flight, two terns dove at each other, alternately calling crescendo and then diminuendo *ki-ki-ki-kikikiki-kree-kree-kree-kree;* the dive was usually followed at once by a violent zigzag glide, with wings set in a curve below the body and tails furled and depressed. During the zigzag their call was *keee-yéah*. Sometimes the glide was replaced or followed by the slow-willowy flight and the same call. We saw none carrying fish in this flight.

Nesting Success

Twelve nests were robbed by an Eskimo dog on the night of July 27. The robbed nests were those we had checked most often; perhaps the dog was led to them by our tracks. We have no information to indicate that the Eskimos at Eclipse Sound collect tern eggs for food.

Reactions to Intruders

The terns showed marked concern toward human intruders, typically as the intruder entered the nesting area. A shallow pool inside the gravel beach, across which birds flew to feed in the sea at the mouth of the river and in which they dipped and bathed, was included in the area where birds showed concern. Although 70 yards from the nearest nest, more terns actually flew overhead when we were on the edge of the colony than in the middle of the nests. They were noticeably silent in comparison with Common, Roseate, and Least Terns *(Sterna albifrons)* in similar situations. Both parent birds showed aggressive behavior (more violent than that of Common Terns), but one of the

pair was especially violent and attacked while the other remained apart. Both cried *keh keh keh kak* (a call of anger, Tinbergen, 1931) as they dove, and one of the pair often struck. As others have commented, each pair actively attacked only near its own nest, and withdrew as soon as the intruder moved to a neighboring nest and out of the nest territory.

Feeding

The birds flew out to sea off the mouth of the river to feed at all hours, but most conspicuously in the mid-morning (0800-1100) and late afternoon (1700-1900). Over the open water they fed by hovering, dipping, and diving. They often went far out along the leads to the middle of the Sound. They also hovered and dipped over fresh-water pools behind the gravel bars, where there were tiny fish fry. At sea they were seen to be feeding on shrimp and a red amphipod. The hovering flocks constantly communicated by a soft *tchip*, barely audible at thirty yards. We saw terns bathe in the sea as well as in fresh water.

Our observations agree with those of Sutton (1932) on Southampton Island that terns were essentially unmolested by jaegers. Terns drove Long-tailed Jaegers away from the nesting colony and from the flocks fishing over the slush on the lee shore of the leads. The jaegers fed in the same way as the terns, and we saw jaegers attack or pursue terns only twice.

DISCUSSION

Displays of three subgroups of Laridae

Our observations of the displays of jaeger, gull, and tern illustrate details of "courtship" actions which at first do not suggest similar origin. Moynihan's careful studies, however, single out elements in gull postures which, when recognized, can be traced into the postures of the jaegers and terns. It is strong support for the correctness of the Moynihan study that the elements recognized first in the hooded gulls can be seen in these others.

The three species we watched form an interesting series: Arctic Terns were delayed in their arrival but rapidly went through the early stages of the reproductive cycle and many pairs laid complete clutches. Herring Gulls seem to have been undisturbed in their progress through pair formation, and when the pairs were formed they left to take up territories elsewhere. Long-tailed Jaegers were interrupted during the pair formation stages, presumably because of lack of prey. I will discuss non-breeding below.

The aggressive-upright and anxiety-upright postures (Moynihan, 1955) can be recognized in all three species. Appeasement postures seem various in the three: stretch posture in Arctic Tern, continued food-begging in Herring Gull. I don't think I saw an action in jaegers which clearly functions in this way, but the similarity of the head-wagging to head-flagging in hooded gulls suggests similar function.

Moynihan (1956) assigns aerial displays to the very general category "produced by simultaneous activation of the attack and escape drives." Aerial displays have been described for Skua and Parasitic Jaeger by Selous, Perry, Williamson, etc., as including sailing with wings held over the head (Skua), and involving twisting chases, towering and

stooping, and being accompanied by a long call which Moynihan suggests tentatively is the same as a gull's long call. Tingergen's (1931) description of fish flight must be an aerial display specialization of this sort, and it is associated with the terns' equivalent of the long call. As Moynihan points out, larger gulls in general omit aerial display, as is the case with Herring Gull. Smaller gulls which spend much time flying in search of food "use" display flights conspicuously. It is not surprising that jaegers and skuas, living by their superb flight, should build display of their flight into their courtship.

It is interesting, and further confirmation of Lorenz' idea that the action precedes the structure, that Long-tailed Jaegers seem to "show" their winglinings in an aggressive situation. The meaning of this act is itself obscure, however. Just the same, it must be beyond coincidence that wings were raised regularly in especially hostile situations in all three species discussed here: jaeger when on its perch; gull when attacking a Glaucous Gull; tern when on its territory in the bent and stretch postures. In each case intention movements for flight are suggested, but that is not enough explanation, if for no other reason than that the jaegers have a white patch at the base of the primaries and the gulls a black and white patch at the tip.

The displays of Long-tailed Jaegers are most suggestive of those of terns. They have a willowy and social display in the air, followed by repeated visits to a site for "recognition." This may only be reflection of emphasis of flight displays.

Non-breeding and delayed breeding

The most conspicuous feature of these three species was the non-breeding of Long-tailed Jaegers; but the terns' delay in starting their breeding cycle presents just as interesting a biological problem.

Long-tailed Jaeger

Manniche (1910) correlated the bad lemming year of 1907 with non-breeding of jaegers. Many other authors have noticed the closely parallel fluctuations of predators with their lemming prey. Bird and Bird (1940) and Marshall (1952) summarized knowledge to date of non-breeding in the Arctic, and listed the many authors who have commented on it. Pitelka, Tomich, and Treichel (1955) have discussed the mechanisms of the effect of prey density upon the reproduction of Pomarine Jaegers *(Stercorarius pomarinus)* at Point Barrow, Alaska. The population which Pitelka, *et al.*, studied started to breed when lemmings were abundant at the "crash" and subsequently most breeding failed as a result of food lack and vicious competition which led to violent territorial fights and disturbance of neighbors' nests. On Bylot Island the prey crash earlier in the reproductive cycle resulted in halting the cycle at the territory-pair formation stage. Present knowledge of the physiological mechanisms involved in the progress of the reproductive cycle (Marshall, 1952, 1954) suggests that failure of the female to respond to the male's actions early in the chain of reproductive sequence may cause the failure.

F. H. A. Marshall (1936) suggested that lack of one or more of several important environmental stimuli may lead to failure to breed.

As in so many cases in field biology, simple explanations are probably naive. A. J. Marshall (1952) discusses a wide variety of causes which affect a variety of species. In each case, a different factor may be critical, and that factor may have no meaning at all to the immediate species' neighbor on the nesting ground. Marshall's examination of the test is of breeding and non-breeding birds at Jan Mayen strongly supports his comment that it was not possible to forecast the condition of the testis even after collecting. "The time of arrival, within reasonable limits, is apparently not very significant: the important thing is what the bird finds in the environment when it gets there. . . . There is nothing physiologically abnormal with the adult male non-breeder of several species, including passerines, waders, gulls, and auks. . . . All the evidence suggests that each species has evolved a hereditary response to an environmental 'pattern' (including behavioural interactions between the sexes) and that if, in any locality, one or more important external stimuli are not present, the neuro-endocrinal reactions are not carried forward to fruition and so reproduction will not occur."

Arctic Tern

Lack (1933) observed on Bear Island that Arctic Terns nested in different areas on successively later dates, as those places became free of snow and available for nest sites. Marshall (1952) showed in his tests on Jan Mayen that he could not cause second laying by destroying the first clutch. Bertram, Lack, and Roberts (1934) suggested that Arctic Terns delay the advance of ovulation when nesting sites are not suitable. Manniche (1910) and Bird and Bird (1940) suggested that ice conditions affect the breeding of Arctic Terns, and this may be associated with Palmer's (1941) suggestion that lack of fish for "fish flight" has a detrimental effect on the courting behavior in Common Terns.

Seligman and Wilcox (1940) suggest that in an area where Arctic Terns arrived late (Jan. Mayen), the gonads might even have passed the peak of potential breeding activity before they arrived.

It may be argued that in many of our nests (eight with only one egg), the birds had been delayed so long that they were beyond the peak of reproductive potential and showed smaller, late clutches, as many people have found and we have found in Lapland Longspurs (Drury, 1960). The evidence presented above under clutch size, however, shows that frequency of single egg clutches was no higher at Bylot Island than on Machias Seal Island, Maine.

All of these pieces of evidence converge on a general explanation that the Arctic Terns arrived in the general area of Eclipse Sound ready to follow to the next stages of pair formation and nest site occupation, but did not cross wide areas of ice until leads opened up. It has been my experience in Bylot Island, the Canadian Yukon, and Finland that Arctic Terns do cross stretches of ice when there are large cracks in it, and when there is ice-free water near the colony site. Upon arrival, the suitable conditions at the colony site stimulate the birds to start their mutual excitement and to carry through the reproductive cycle.

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PENGUIN FLIPPER-BANDS USED BY THE USARP* BIRD-BANDING PROGRAM 1958-60.

By W. J. L. SLADEN and R. L. PENNEY

Flipper-bands were designed for Adelie, *Pygoscelis adeliae*, and Gentoo, *P. papua*, Penguins in 1948 (color bands) and 1949 (aluminum) (Sladen, 1952: 543) and have since been used extensively on other species, with varying success, by British, French and Australian Antarctic expeditions. These bands have several advantages over bands placed around the tarsus (Richdale, 1951), or around the feathered tibia, but they require very careful fitting. Some of the problems of this technique have been discussed by Gwynn (1955), Austin (1957), and Sladen & Tickell (1958).

The bands described here were designed for the USARP Bird-banding Program**, and are being used by U. S. and New Zealand biologists in studies now being conducted in the Antarctic on population dynamics, behavior, orientation, navigation and physiology of penguins.

Both of us travelled on *U.S.S. Staten Island* during the summer season of Operation Deep Freeze IV, 1958-9. Penney left the ship in February to winter-over at Wilkes Station (66° 15′ S., 110° 31′ E.), and reports here on the success of the 1958 Adelie flipper-band design.

For Emperor Penguins *(Aptenodytes forsteri)*

As the size of the flipper varies more in Emperor Penguins than in Adelies, bands must be used on Emperor flippers with much care, and fitted exactly. More trials are needed before they are used in large numbers.

In the two designs described, the reference number lies on the outer face of the flipper, so that it can be read without handling the bird. Most of the address is hidden in the axilla.

Footnote:— *=United States Antarctic Research Program
Footnote:— **This program started in December 1958, is in collaboration with the U. S. Fish & Wildlife Service and supported by the National Science Foundation (N.S.F. G6327 & G9990).

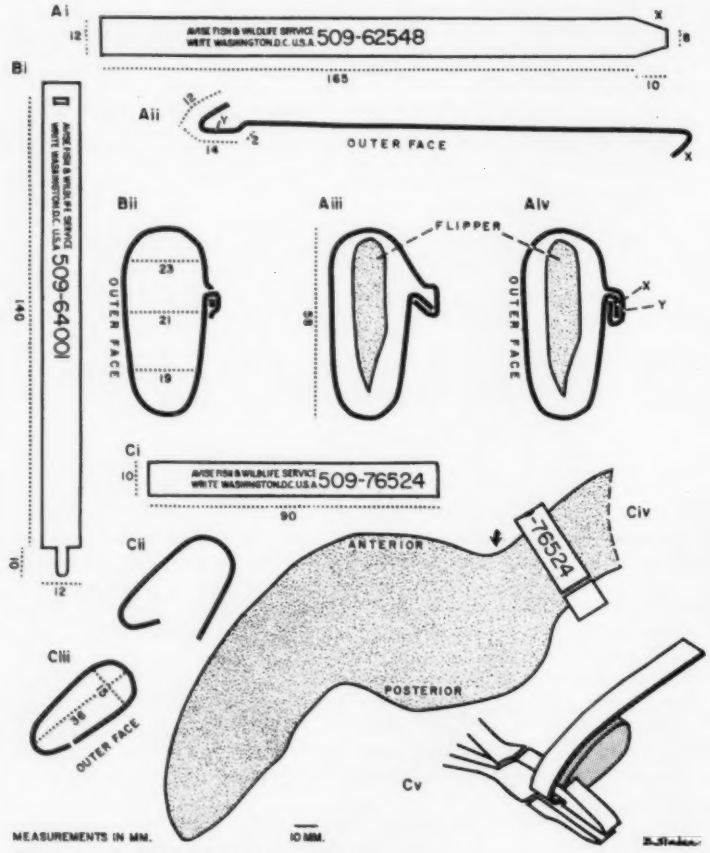

Figure 1. *USARP Penguin-flipper bands*

A 1958 design for Emperor Penguin. (i) first shaping. (ii) second shaping. (iii) shaped around flipper. (iv) final position.

B 1959 design for Emperor Penguin. (i) strip as supplied. (ii) final position around flipper.

C 1958 & 1959 designs for Adelie & Chinstrap Penguins. (i) the strip supplied in 1958, cut to correct length. (ii) the pre-shaped band supplied in 1959. (iii-iv) final position around flipper. Comment on the arrow is in text. (v) pliers for shaping strips. Shows strip partly shaped.

A. *1958 design* (see figure)

Metal: 3SH12 Aluminum, gauge 0.050 inch. Made in the field from strips 25 cms. long and 12 mm. wide.

This design was based on a clip-type previously used for Adelie Penguins (Sladen 1958; Sladen & Tickell 1958,7). One end, "X", of the strip is trimmed on either side (see Ai) so that

when the clip is finally squeezed together (Aiii & iv) with the pliers, the edge marked "Y" is crimped over into the spaces left by the trimming. "X" is thus enclosed from the sides and is prevented from slipping sideways.

This design was developed at a newly-discovered Emperor rookery off Coulman Island (73° 21′ S., 170° 40′ E.), Victoria Land, to which we were transported by the *Staten Island* helicopter. 51 adults and 49 chicks were banded here. After some experience, we found that the enormous adults were not difficult to band, though the process was slow, and padded trousers were needed. The penguin was caught by the neck and, while still standing, its head and neck were thrust firmly between the knees of the holder, with the bird's back away from him. A second person then placed the band on the flipper. Some birds retaliated by pounding the holder's shins with their flippers; others, especially the young, remained quiet, making it possible for one person to do the banding himself.

B. *1959 design* (see figure)

Metal: 3SH14 Aluminum, 0.050 inch gauge, 12 mm. wide.

The 1958 design was changed because the clip is too complicated for general use and apparently can be forced apart by ice (see Sladen & Tickell, 1958, 12). The simple device of tongue and slot of the 1959 design is adequately described in the figure. It is being used during the 1959-60 season.

For Adelie and Chinstrap Penguins *(Pygoscelis adeliae* and *P. antarctica)*

C. *1958 and 1959 designs* (see figure)

Metal: 52SH12 Aluminum (1958 design) and 5052H32 Aluminum (1959 design), and both 0.064 inch gauge and 10 mm. wide.

Improvements on old designs suggested previously (Sladen & Tickell, 1958, 12) were considered in developing these bands. Making them of tough metals (the 1959 band is slightly tougher), enables them to be of the butt-end type, that is, without over-lap or locking device. They are therefore very simple to use. When the band is in place, the five-figure reference number can be read through binoculars from a distance of 60 feet.

The 1959 band is pre-shaped in the factory; the 1958 one is distributed as a strip (Ci) to be shaped in the field. Penney made a pair of pliers for the shaping, on one jaw of which is welded a piece of iron filed into a mold for the band. The end of the strip carrying the address is gripped by the whole width of the jaw, and the strip bent around the mold (see Cv), and adusted so that the ends meet squarely. Shaping takes about 7 seconds. Before the band is closed on the flipper, it is important to try to pull the band off distally to see if it will restrict the movement of the joint, or come off. 4% of the bands of the 1958 and 1959 designs will do this and must be replaced by smaller ones. Opening and closing of the band more than once weakens it, so must be avoided.

Four Chinstrap Penguins, which take the same size of band as the Adelies, were banded on Sabrina Islet (66° 55′ S., 163° 20′ E.), Balleny Islands, on 27 January, 1959. This species was a new discovery for this part of the Antarctic (Sladen, in press).

Nearly 1700 Adelies were banded from the *Staten Island* and at Wilkes Station during the 1958-9 season. At Wilkes, 459 of them were adult birds, and of these, 266 (58%) were found at the same rookeries during the next breeding season. No injuries were seen. A 58% recapture of banded adult Adelies may not be high when one expects breeders that are well established to return to the same or nearby nest-sites (Sladen, 1958: 70). But banding at Wilkes began at the end of the season, and the breeding status of the adults could not be determined. However, 74 were feeding chicks and 55 of these were recaptured (74%). 87 others were occupying nest-sites and 67 of these were recaptured (77%). Between banding and recapture, the birds had molted and spent a winter at sea. So, with allowances for some deaths from usual causes, and some scattering of unestablished birds to the numerous other rookeries nearby, these may be very good rates of survival. Four of the 266 Adelies recaptured at Wilkes had partly-opened bands, but we believe the tougher metal of the 1959 band will stop this. As with other flipper-bands, there is slight wearing of the feathers along a few mm. of the anterior border of the flipper (at the point marked by the arrow in Civ), but this does not harm the bird. It can be almost eliminated by grinding down the square edge of the band at this part, and by reducing the interior length of the band from 36 mm. (see Ciii) at 34 mm.

We are grateful to A. Duvall, U. S. Fish & Wildlife Service and C. Biehl, Gey Band and Tag Co., for valuable advice for the USARP Bird-Banding Program; to Brenda Sladen for the illustration; to O. L. Austin, Jr., for comments on the text; and to R. Goldsmith, G. Caughley, B. Reid, J. Roberts, J. Premsic and men of *U.S.S. Staten Island* for field assistance.

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SOUTHEASTERN BREEDING RANGE OF THE BROWN-HEADED COWBIRD

BY JOHN S. WEBB AND DAVID KENNETH WETHERBEE

Records have accumulated in recent years which attest the belief that the Brown-headed Cowbird *(Molothrus ater)* is extending its breeding range southward and eastward in the Gulf and Atlantic coastal plain area. An adult male cowbird was taken from a net set beside Lake Alice, Gainesville, Florida, on July 7, 1958. A female cowbird in heavily streaked juvenal plumage was taken from the same set on July 28, while three other cowbirds, females or juveniles of undetermined sex, were seen nearby. The female was preserved and given to the Florida State Museum (Accession Number 3670). Dissection showed an ovary which measured 3 mm. long.

The presence of these juveniles in Florida at this early date is believed to constitute evidence that cowbirds breed farther southeast than the fifth edition of the A. O. U. Check-list indicates. Burleigh apparently suspected a southeastern breeding population, for he commented on the difficulty of reconciling the numerous early-summer sight records of immature birds with the relatively late southward migration of the northern breeding population (Georgia Birds, p. 600, 1958). Howell listed such early-summer sight records made by Stoddard July 14, 1930 at Pensacola and July 29, 1927 in Wakulla County (Florida Bird Life, p. 435, 1932). Similar records were made by Craighill in June of 1936, 1937 and 1938 in Dare County on the North Carolina coast (Grey and Murray, *Auk*, **58:** 102, 1941). Still others are on file in the Bird Distribution Office of the Fish and Wildlife Service, including Florida records for July 23, 1950 at Jacksonville, by W. Y. Gary and for July 31, 1926 in Pasco County by A. B. Cannon.

Cowbirds ordinarily have been considered winter visitors in the southeast coastal plain. McClanahan listed the species as an irregular winter resident from November 13 to March in the Gainesville area *(Proc. Fla. Acad. Sci.*, **1:** 101, 1936) and Sprunt cited the cowbird as "an irregular visitant in all parts of the State from midsummer to April but with no record of breeding" (Florida Bird Life, p. 446, 1954). Howell considered the bird an "irregular winter resident" in Alabama, though occasional in summer (Birds of Alabama, p. 205, 1928). In coastal South Carolina the cowbird was designated as "common only in the winter months of January and February" but was "present from June 25 to March 19" (Sprunt and Chamberlain, South Carolina Bird Life, p. 506, 1949). Brimley reviewed scores of migration records from 1885 to 1941 at Raleigh, North Carolina, and tabulated the species as a winter visitor from early September through April (Pearson, Brimley and Brimley, Birds of North Carolina, p. 404, 1942).

The known and suspected southeastern breeding range of the cowbird (as of June, 1959) is plotted in Figure. 1. Evidence for recent extension of breeding range is annotated below. Records cited are grouped by numbered areas which conform with the map numbers

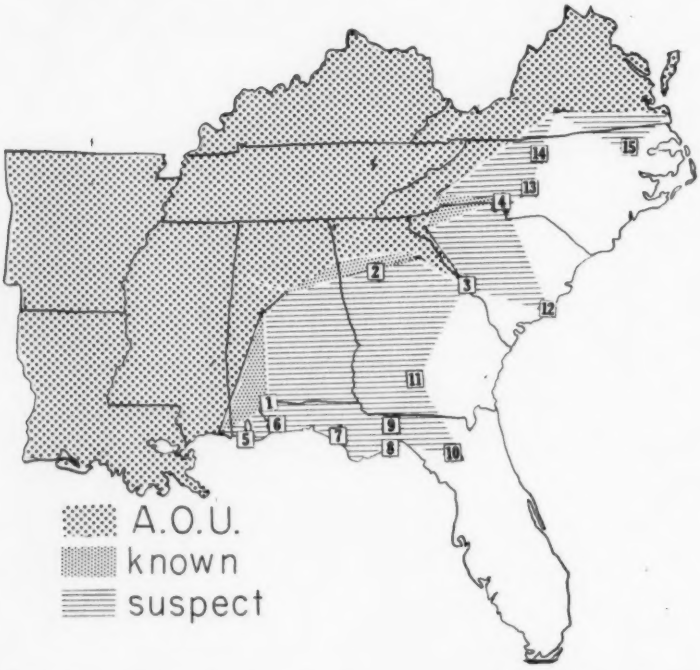

Figure 1. Extension of breeding range of Brown-headed Cowbird in southeastern United States. Numbers refer to annotated list in text

used in Figure 1. Literature published since 1952 supplied the principal data, but a few pertinent earlier references were included. Information from the files of the Bird Distribution Office of the Fish and Wildlife Service also was incorporated. We are grateful to Dr. Oliver L. Austin, Jr., for assistance in the field, to Chandler S. Robbins for help with the literature and to Dr. Lucille F. Stickel for reviewing the manuscript.

ANNOTATED LIST OF DISTRIBUTION RECORDS

Records cited are grouped by areas numbered in conformity with Figure 1.

1. Florida, Escambia County, five miles south of Bratt, June 8, 1957.
Female cowbird collected by Weston, McMillan and Monroe, and now in the collection of the University of Louisville, "had ovaries in breeding condition, enlarged eggs measuring 20, 8 and 5 mm." (Monroe, *Florida Naturalist*, **30:** 124, 1957). This bird "contained eggs in advanced stages of development. The largest would have been laid the next day had the bird lived" (Newman, *Audubon Field Notes*, **11:** 412-413, 1957).

2. Georgia, Fulton and Dekalb Counties.
   a. Fulton County, five miles from Atlanta, May 1949.
   ". . . on May 19 . . . the nest of a pair of Hooded Warblers contained

one young warbler, one young Cowbird and one unhatched egg . . . On May 24 both birds left the nest and the Cowbird was collected" (Parks, *Oriole*, **15**: 8-9, 1950).

b. Fulton County, five miles from Atlanta, May 27, 1950.
". . . a young Cowbird . . . was hardly more than three or four days out of the nest and was being fed by a pair of White-eyed Vireos" (Parks, *Oriole*, **15**: 32, 1950).

c. DeKalb County, Decatur, June 7, 1958.
Hooded warbler nest with one warbler egg and one cowbird egg found by Parks (Chamberlain, *Audubon Field Notes*, **12**: 405, 1958). Near this nest ". . . another of the Warbler's eggs was found. On the following day I found the female incubating" (Parks, *Oriole*, **23**: 48-49, 1958).

3. Georgia-South Carolina, Middle Savannah Valley.

a. Georgia, Richmond County, Augusta, May 1958.
Hooded warbler nest with two warbler eggs and one cowbird egg found by Denton (Chamberlain, *Audubon Field Notes*, **12**: 405, 1958). ". . . on May 18 all three eggs had hatched" (Denton, *Oriole*, **23**: 38, 1958).

b. Middle Savannah Valley.
"It [cowbird] returns to this region in July and August" (Murphey, *Contr. Charleston Museum*, **9**: 53, 1937).

4. North Carolina, Mecklenburg County.

a. Charlotte, July 11, 12, 1958.
". . . the Norwoods watched a Red-eyed Vireo feeding a cowbird just out of the nest" (Chamberlain, *Audubon Field Notes*, **12**: 405, 1958).

b. Mint Hill, July 7, 1956.
". . . flock of about 22, chocolate-brown heads of males very conspicuous" (Norwood, *Chat*, **20**: 83, 1956).

5. Alabama, outer coast.

a. Mobile County, Dauphin Island, June 15, 1956.
Adult cowbirds seen by Imhof (Newman, *Audubon Field Notes*, **10**: 390, 1956).

b. Baldwin County, Fort Morgan, June 12, 1955.
Adult cowbirds seen by Stevenson (Newman, *Audubon Field Notes*, **10**: 390, 1956).

6. Florida, Escambia and Santa Rosa Counties.

a. June, 1957.
Single cowbirds, "the first ever observed there in that month, were noted by several observers in the northeastern part of the state at various localities right down to the coastal woods" (Newman, *Audubon Field Notes*, **11**: 412-413, 1957). [See also Monroe, *Florida Naturalist*, **30**: 124, 1957].

b. May 17-July 31, 1958.
". . . the presence of Brown-headed Cowbirds at several points (Weston and Monroe) . . . indicates last year's first breeding specimen for Florida was no fluke" (Newman, *Audubon Field Notes*, **12**: 421, 1958).

c. Pensacola, July 12, 26, 1956.
". . . an immature on July 12 was so totally unafraid of humans that it allowed itself to be caught by hand in the open (Monroe) and a flock of 50 birds, mostly young ones, was seen on July 26 (Weston), much the earliest date for so large a group" (Newman, *Audubon Field Notes*, **10**: 390, 1956).

d. Pensacola, May 10, 1957.
". . . the female member of a pair of Brown-headed Cowbirds . . . 'had the skulking actions of a breeding bird' (Monroe)" (Newman, *Audubon Field Notes*, **11**: 356, 1957).

7. Florida, Bay County, Panama City, June 8, 1958.
Cowbirds seen by Olson (Newman, *Audubon Field Notes*, **12**: 421, 1958).

8. Florida, Franklin and Wakulla Counties.
   a. Alligator Point, July 5, 1957.
      ". . . The collecting of an immature cowbird . . . is an interesting corollary of the first evidence of its breeding in the state, as the date is far in advance of any other in Florida" (Stevenson, *Audubon Field Notes*, **11**: 401, 1957).
   b. St. Marks Light, August 8, 1955.
      Cowbirds seen by Stevenson *et al* (Stevenson, *Audubon Field Notes*, **9**: 374, 1955).
9. Florida, Leon County.
   a. "Cowbird . . . was common up to 1893, since which time I have never seen a single specimen, although I have made every effort to find it" (Williams, *Auk*, **21**: 457, 1904).
   b. Lake Jackson, August 9, 1925.
      ". . . Stoddard saw a flock of 15 or more, in dull plumage, on or around cattle" (Williams, *Auk*, **45**: 169, 1928).
   c. Tallahassee, July 19, 1955.
      ". . . Early Brown-headed Cowbirds were encountered (15 females and/or immature males)" (Stevenson, *Audubon Field Notes*, **9**: 374, 1955).
10. Florida, Alachua County, Gainesville.
   a. July 7, 1958.
      Adult male specimen taken by Webb and Wetherbee (this paper).
   b. July 28, 1958.
      Juvenile female specimen taken and three females or male juveniles seen by Webb and Wetherbee (this paper).
11. Georgia, Tift County, Tifton.
   a. July 13, 1942.
      Species recorded (Norris and Hopkins, *Oriole*, **18**: 8, 1953). Sixty birds estimated by William Griffin, Milton Hopkins, Jr., and Robert Norris according to records in Bird Distribution Office of Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland.
   b. July 26-August 6, 1944.
      400 birds estimated July 26, species became common August 6 according to Willard Gaulding, Jr., from records in Bird Distribution Office of Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland.
12. South Carolina, Charleston County, Charleston. July 8, 1957.
      ". . . presence of several immature cowbirds . . . suggests breeding" (Sprunt, *Chat*, **21**: 90, 1957).
13. North Carolina, Stanly County, Albemarle, June 27, 1957.
      ". . . Norwood found 7 male Brown-headed Cowbirds in a barnyard . . . in company with a large flock of Common Starlings" (Chamberlain, *Audubon Field Notes*, **11**: 399, 1957).
14. North Carolina, Guilford County.
      ". . . June 5 is the latest date on which an adult has been seen. Young have been seen" (Dawley, *Chat*, **18**: 39, 1954).
15. North Carolina, Edgecombe County, Rocky Mount.
   a. July 18, 1954.
      ". . . scores of immature Brown-headed Cowbirds, associated with a few adults and House Sparrows (Joyner)" (Chamberlain, *Audubon Field Notes*, **8**: 340, 1954).
   b. June-July, 1956.
      ". . . about 6 male Brown-headed Cowbirds were seen June 28; on July 15 at nearby Old Town, a 'large flock' of both sexes as well as immature birds appeared (Joyner)" (Chamberlain, *Audubon Field Notes*, **10**: 378, 1956).

SUMMARY AND CONCLUSION

Adult and young cowbirds observed and collected near Gainesville, Florida, in July, 1958 constitute the southeasternmost record of suspected breeding. The known and suspected extension of breeding range

in recent years is reviewed and mapped. Evidence for the known extension consists of a collected nestling specimen, a collected adult specimen with eggs ready to be laid, two observations of eggs being incubated and three of nestlings being fed. Suspected extension is based on 26 early-summer sight records and three juvenile specimens collected in July.

We believe that our records and those in the literature are best interpreted as extensions of the breeding range. It is possible, however, that some records could reflect periodic but poorly understood early summer movements of the species southward and eastward from breeding areas. Extensive banding of nestlings could show definitely whether such movements regularly occur.

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GENERAL NOTES

Analysis of Chimney Swift Returns at Kent, Ohio, 1956-1959[1].—The annual study of Chimney Swifts *(Chaetura pelagica)* roosting and nesting on the campus of Kent State University at Kent, Ohio, has been continued for a total of 16 years. This report will summarize the returns over the past four years.

Swifts began returning to the campus on April 26, 1956. That year there were 48 returns from the following banding year-groups: 1947 (2); 1949 (4); 1950 (2); 1951 (4); 1952 (3); 1953 (10); 1954 (10); 1955 (13). Twenty-two were known males; 14 were known females. The remainder have not yet had their sex determined. A total of 36 of these took part in nesting on the campus. Including all birds, newly banded as well as returns, there were 17 pairs and 2 threesomes, each in a separate air shaft of which there were 86 available to the birds. Two air shafts, inconvenient to reach, were not included in the study that year. Twenty birds were first recaptured in 1956 in air shafts where they had formerly nested; three others were taken from shafts in which they had formerly been visitors with a nesting pair. Nine were first recaptured that year from a former roosting shaft. Eight were also first taken from those shafts in which they had originally been banded, but only two of them had been banded as juveniles.

Ten birds returned with their former mates, and these five pairs continued as mates nesting in the same air shafts which each pair occupied in 1955. Six birds on the other hand returned with their former mates, but each obtained a new mate. Two continued to nest in the same shaft with the new mate while four of them nested in a different shaft with the new mate in 1956. Four swifts came back without their previous mates, but they nested again in the same shaft with a new mate, while four others without their former mates acquired a new mate and nested in a new shaft. One bird returned to continue as an all-season visitor with the same pair as in 1955, while another former visitor returned to become a mate in the same shaft it had occupied

[1]Partial support for this research was provided by the U. S. Atomic Energy Commission, contract AT (11-1)-411.

as a visitor. One other former visitor became a mate, but in a different shaft, when it returned in 1956. Two birds became a visitor with a mated pair forming a threesome in each case (one of these two was a yearling). One pair which had been mated in 1950, 1951, and 1952, but had different mates the following three years, was reunited as a mated pair in 1956.

Eight swifts nested for the first time on the campus. Three birds were recaptured for the first time since they were banded—one had been banded in 1948, but had not remained on the campus any year since banding; another had been banded in 1953 and was found dead in 1956 in the City of Kent; and the third had been banded in 1954 and remained to nest in 1956 for the first time. Seven returns did not spend the summer on the campus. Only two of these had previously nested on the campus (one returned with its former mate, and one returned with its former visitor, but neither remained to nest in 1956); another was a former visitor with a pair although it had never nested itself; and a fourth one was a yearling. One female swift (20-188672) which was banded at Kent on July 20, 1952, returned in 1953 and 1954, and was captured by Gordon Hight on September 19, 1954, at Rome, Georgia (*Bird-Banding*, **25**(4): 150-151. 1954), continued to return to Kent each year through the season of 1956. Three returns perished in a trapping accident *(Inland Bird-Banding News*, **29**)3): 32. 1957). Swifts were last seen on the campus on October 6.

In 1957 the swifts began returning to the campus on April 20. A total of 37 was eventually recorded from the following banding year-groups: 1947 (1); 1949 (3); 1950 (2); 1951 (2); 1952 (1); 1953 (6); 1954 (5); 1955 (9); 1956 (8). Seventeen were known to be males; 14 were known to be females. Thirty-one of the returns took part in nesting on the campus. Including newly banded birds, there were altogether 14 pairs and four threesomes. Seventeen were first recaptured in 1957 in shafts where they had formerly nested. Three were first recaptured that year in shafts where they had formerly been occasional visitors, and one from a shaft where it had formerly roosted. Four were taken as returns from shafts where they had originally been banded, but only two of these were banded as juveniles.

Five pairs returned and remained as mates in the same shaft where each pair had nested in 1956. It was the fourth season for one pair to remain mated. Two other pairs also continued mated to each other, but each in a different shaft in 1957. Five birds returned without their former mates, acquired a new mate, and nested in the same shaft as previously. It was the eighth nesting season in the same shaft for one of these and the fifth season for another. One returned with its former mate which soon disappeared, and subsequently a new mate was acquired for nesting in the same shaft. Four others that returned without their former mates, mated anew in a different shaft in 1957. Two former all-season visitors returned to become parent birds, but each in a different shaft than formerly occupied. Two birds became all-season visitors with mated pairs. One was a yearling and possibly an offspring of the pair with which it stayed. The other was newly banded. Eight birds nested for the first time on the campus, but six of these had not been banded previous to 1957. Six returns did not remain on the cam-

pus to nest, but only one of these had previously nested on the campus, and three others were probably yearlings. Three returns had not been recaptured the year before, but without much doubt, they had nested in the two shafts not studied that year. They were found nesting in those shafts in 1957. Two of the three had also nested in those shafts in 1954 and 1955. The last swift seen on campus was one released from a trap on October 1.

In 1958 the returns totaled 51. Distribution by year of banding was as follows: 1947 (1); 1949 (2); 1950 (3); 1951 (4); 1952 (2); 1953 (6); 1954 (4); 1955 (7); 1956 (6); 1957 (16). To date 18 are known to be males, with an equal number of known females. Forty of the returns nested on the campus. In trapping returns, 23 were first recovered in 1958 from the shaft in which they had previously nested. Nine others were first taken that year in a shaft in which they had formerly roosted, while 10 were taken from the shaft in which they had originally been banded. Two visitors with mated pairs of the previous year returned to nest themselves in 1958. Three swifts which returned from the 1957 nesting group did not nest on the campus in 1958, and a visitor of the previous year did not remain on the campus in 1958. One bird was recaptured for the first time since it was banded in 1951; another one for the first time since it was banded in 1952. Three swifts were retaken for the first time since banded in 1955. The last swifts remaining on the campus were seen in the evening of October 9.

In 1959 the returns totaled 55, as follows: 1947 and 1949 (1 each); 1950, 1951, and 1952 (2 each); 1953 (4); 1954 (3); 1955 (6); 1956 (5); 1957 (13); 1958 (16). The oldest bird recovered is at least 13 years of age, which is the oldest known Chimney Swift with a continuous life history record. Known males numbered 16, while known females numbered 17. Forty of the returns nested on the campus. Twenty-seven were first retaken that year in a shaft in which they had nested in 1958. Eight others were first retaken in a shaft where they had formerly roosted, and eight were first taken from the shaft in which they had originally been banded.

Four swifts, three mated birds and one visitor, returned from the 1958 nesting colony but failed to nest on the campus in 1959. One bird was recaptured for the first time since it was banded in 1952; one was taken for the first time since 1956; and another was taken for the third time since it was banded in 1950 (returns in 1955, 1958, 1959). The last two remaining birds on the campus were present in the evening of October 14. These were the swifts with the 13-year-old record (42-188523) and his mate for the past three seasons. These two were the last birds remaining on the campus during the preceding year as well.

Similar analyses for the preceding five years will be found in the following references: *Bird-Banding*, **23**(2): 73-74. 1952; **24**(1): 17-18. 1953; **25**(2): 60-61. 1954; **27**(2): 83-84. 1956.—Ralph W. Dexter, Department of Biology, Kent State University, Kent, Ohio.

Use of Decoys in Netting Shorebirds—Following several months of near fruitless attempts at catching shorebirds for banding purposes, the authors hit upon the idea of placing decoys near a suspended mist

net in order to attract the birds into the net. This system has proved to be very successful in capturing dowitchers, semipalmated and western sandpipers and dunlins, as well as a few individuals of other shorebird species.

Decoys used are simply profiles cut from plywood or even pasteboard, with a heavy wire rod attached for sticking into the sand. Our coloring of the decoys has been rather sketchy, but this apparently makes little difference to the birds. The decoys are generally set up in a clustered line about three or four feet from a mist net suspended crosswind by sturdy bamboo poles. It has been our experience that the majority of birds come toward the net from the leeward; therefore the decoys are placed to the windward of the net so that the birds strike it as they approach the decoys at a good rate of speed.

The net and decoys are generally set up in a shallow pond or mud flat frequented by the birds. (Attempts at netting with decoys on the open beach have not been so successful.) If birds are numerous, such as at the peak of migration, we have successfully "chipped off" the ends of resting flocks time after time without disturbing the main group. These flushed birds usually circle the pond or flat, then come in to the decoys and are captured. We took about 35 dowitchers in one afternoon by this method. With smaller flocks at rest, it is often necessary to chase them up from alternate resting spots in the hope that they will then settle down with the decoys. In such a case, we have had a flock of 30 or more dowitchers strike the net at one time, with about half of them captured.

When the birds are not at all numerous or have not yet arrived on the "resting" flats from their feeding forays, it is often profitable to set up the decoys and net on the vacant flat, then settle back to await the arrival of shorebirds a few at the time. If birds are not allowed to settle nearby, incoming shorebirds almost invariably come to the decoys, allowing the capture of singles, or of two or three birds at the time. Through an afternoon, a good number of birds may thus be taken in what seems to be an unpromising situation.

We have been unsuccessful so far in attempts at capturing willets and black-bellied plovers by use of decoys. All of these will approach the decoys, but they veer sharply as they near the net. Dowitchers, easily taken by themselves, are almost impossible to catch when they are flocking with willets, as they apparently follow the willets' lead in turning away from the net at the last moment.—Horace Loftin, Dept. of Biological Sciences, Florida State University, Tallahassee, Florida, and Storrs Olson, Tallahassee, Florida.

Band Retention—During the past five years we have double-banded seven Bald Eagles *(Haliaeetus leucocephalus)* and four Great Horned Owls *(Bubo virginianus)*. One of the birds, a Bald Eagle, was trapped during migration; the remainder were banded as nestlings. A conventional butt-end band was placed on one leg of each of these birds and a locking-type band on the other leg. The locking bands were of two types formerly issued by the Biological Survey. (A different, and superior, locking band is currently being issued by the Fish and Wildlife Service to some cooperators.)

We have received recoveries on three of the eleven birds. All three were wearing only the locking band when recovered. One of the Bald Eagles lost the butt-end band within 33 days after banding.

The returns are listed below:

#A-712631. A nestling Great Horned Owl banded May 13, 1956 at Milwaukee, Wisconsin, was found dead about March 14, 1957 south of Grafton, Wisconsin.

#A-712627. A nestling Bald Eagle banded July 11, 1953 near Lake Tomahawk, Oneida County, Wisconsin, was "found dead . . . May have been shot" on January 2, 1954 at Richland, Wisconsin.

#235651. An immature female Bald Eagle was trapped and banded on October 29, 1954 at Cedar Grove, Wisconsin. We released the bird on October 31, 1954. It was found unable to fly on December 2, 1954 nine miles south of Fairmont, Martin County, Minnesota. The bird was subsequently nursed back to health and released.

We recommend that locking bands be used on all raptors requiring bands of size No. 6 or larger.—Daniel D. Berger, Cedar Grove Ornithological Station, Cedar Grove, Wisconsin, and Helmut C. Mueller, Department of Zoology, University of Wisconsin, Madison 6.

A Hummingbird in Difficulty—On the morning of June 4, 1959, attracted by the barking of my Labrador Retriever, I discovered on the ground, just outside my fenced yard, a male Ruby-throated Hummingbird, *Archilochus colubris*. As I approached, he rose into the air about three feet and flew, with evident difficulty, about five feet, then dropped to the ground again. I could see that something was trailing from him, and upon picking him up, I found a mass of matted spider-web tangled about one foot and hanging from it. Apparently the weight of the filmy web was too much for the Hummer. Although a few strands were lightly attached to the tip of one wing he was able to use his wings, and it seemed to be entirely the weight of the web which was his undoing. I untangled and removed the strands from his foot, whereupon he flew off with normal flight. Unfortunately I was not able to save the torn bits of this web, but a similar-appearing mass of cobweb weighed just under 0.01 gram.

The labels on two male Ruby-throats in the Cornell University collection indicate their weight when collected: one was 2.4 grams, the other 3.5 grams.—Sally F. Hoyt, "Aviana," Etna, New York.

RECENT LITERATURE
BANDING

(See also Numbers 21, 26, 47, 52, 59

1. The Origin of Winter Visitors to the British Isles. M. J. Goodacre. 1959. *Bird Study*, **6**(2): 37-50. This is the first of a new series of papers, based on analyses of the now quite voluminous data in the B.T.O. and British Birds banding schemes, to determine the source of birds wintering in the British Isles. This first paper, on the Blackbird *(Turdus merula)*, analyzes all the recoveries abroad of birds banded in the British Isles during the winter, the winter recoveries in Britain of Blackbirds banded abroad, and all the recoveries of Blackbirds trapped during migration at the British Bird observatories. The raw data are omitted, but the salient features are shown in the series of 16 maps and broken down to show the breeding range of the wintering British Blackbirds and the wintering distribution in Britain of populations from various parts of that breed-

ing range. These show that Blackbirds wintering in Britain come from breeding grounds in Scandinavia, Germany, Belgium, and Holland. The birds apparently cross the North Sea directly in the autumn, flying southwestward from Norway to Scotland and westward from Germany and Holland to southern England. The northernmost breeders tend to winter the farthest north. Studies of this sort, digesting and making available the results of the rapidly mounting store of banding data, are indeed most welcome.—O. L. Austin, Jr.

2. Bird-banding in Norway, 1958. Report No. 9. (Ringmerkingsoversikt, 1958). Holger Holgersen. 1959. *Sterna*, **3**(7): 269-313. (From the English summary). The 31,192 birds banded in 1958 bring the Norwegian totals up to 325,000. As usual most of the Norwegian banding is of nestlings or downy young, only 17 percent this year being of adults or fully fledged young of the year. Their banding is concentrated largely on seabirds, cormorants and gulls for the most part, through many species of land birds are also handled in numbers. Of these Starlings, Fieldfares, and Pied Flycatchers lead the list with more than 2,000 of each banded. The most interesting of the many recoveries listed are two for the Puffin, *Fraticula arctica*, one banded as a chick in Norway in July and recovered the following December in southwestern Greenland, almost 2,000 miles west-southwest from the place of banding. The second Puffin was banded as an adult in 1936 and recovered in 1957, 21 years later, certainly the age record for this species.—O. L. Austin, Jr.

3. Banding results from the Revtangen Station for 1958. (Ringmerkingsresultater fra Revtangen på Jaeren I 1958.) A. Bernhoft-Osa. 1958. *Sterna*, **3**(7): 314-320. Though the shorebird flight was poor, the banding work at the Revtangen Station was signalized as usual by the exceptional number of waders handled, 975 Dunlins, *Erolia alpina*, alone. Among the wader recoveries of interest were a *Philomacus pugnax* from Italy, a Dunlin from the Soviet Union near Archangel, and a *Tringa totanus* from Senegal, Africa. Also of interest was a fall influx of Redpolls, *Acanthis flammea*, of which 427 were banded.—O. L. Austin, Jr.

4. Results of Bird Banding in Belgium in 1958. (Resultats du Baguage des Oiseaux en Belgique (Exercice 1958).) R. Verheyen. 1959. *Le Gerfaut*, **49**(3): 291-334. The usual Belgian annual report gives no information on the amount of banding done, but lists in detail all the returns and recoveries reported, most of them of little or no significance or interest. The few outstanding records are so buried in the welter of short-time returns to the place of banding and of nearby recoveries that one hesitates to wade through the 40-odd pages of undigested and unselected material to find them.—O. L. Austin, Jr.

5. The Story of Some Herring Gulls Banded in Maine. Mr. and Mrs. G. Hapgood Parks. 1959. *Maine Field Naturalist*, **15**: 91-96. Data on 91 subsequent records (mostly recoveries) of 2,649 Herring Gulls banded in the vicinity of Milbridge, Maine, from 1937 through 1958. A number of those banded as chicks were recovered farther north (Nova Scotia, 4; New Brunswick, 2; Newfoundland, 2), and 1 was recovered on Lake Erie (Ohio).—E. Alexander Bergstrom.

6. "Homing" Cowbirds At Hawk Mountain. Maurice Broun. 1959. *Ebba News*, **22**: 27-28. Of 17 Brown-headed Cowbirds *(Molothrus ater)* transported in May from the place of capture at Hawk Mountain, Pa., 8 returned from distances of 8½ to 45½ miles. The longest of these distances was covered from the southeast, by a male bird which had previously returned from the east, south (twice) and southwest. Broun cites a 1939 record of a male Cowbird homing 184 miles in North Dakota *(Bird-Banding*, **11**: 23). Recently a female returned from Ithaca, N. Y., to Groton, Mass., about 265 miles *(Bird-Banding*, **30**:228).—E. Alexander Bergstrom.

7. Red-eyed Vireo Returns At Washington Crossing. Paul H. Fluck. 1959. *Ebba News*, **22**: 106-108. From 195 Red-eyed Vireos *(Vireo olivaceus)* banded at New Hope, Pa., from 1954 through 1958, 41 birds returned at least once. Of those banded in May, 41% returned (16 out of 39).—E. Alexander Bergstrom.

8. Glaucous-winged Gull (Larus glaucescens) Banded in British Columbia, Recovered in Japan. J. G. Sarles. 1959. *News From the Bird-Banders*, **34**: 44. A gull banded July 29, 1956 at Oak Bay, Chain Islands, British Columbia (near Victoria), was found dead in a fish net at Kushiro, Hokkaido, Japan, on December 2, 1958 (band returned). While the species does winter south to Hokkaido, presumably most of the population wintering there nests in Alaska and tends to be somewhat separate from the population which migrates down the eastern shore of the Pacific.—E. Alexander Bergstrom.

9. A Summary of Returns and Recoveries of Brewer Blackbirds at San Jose, California. L. Richard Mewaldt. 1959. *News From the Bird-Banders*, **34**: 37-39. Data from a resident population of *Euphagus cyanocephalus*, with no birds recovered more than a mile from the banding station. From 1954 to July, 1959, 413 were banded, of which at least 53 were reported or recorded later. No substantial influxes were noted.—E. Alexander Bergstrom.

10. A Banding of Chimney Swifts at Shreveport, La., and Texarkana, Arkansas. Ben B. Coffey, Jr. 1958. *Inland Bird-Banding News*, **30**: 19-20. In an effort to sample populations of Chimney Swifts *(Chaetura pelagica)* southwest of the major banding area at Memphis, Tenn., 271 birds were handled at Texarkana and 2519 at Shreveport, on October 15, 1950. The Shreveport flock included 1 from Ithaca, N. Y., and 2 from No. Mankato, Minn. From the two flocks, 27 recoveries have been reported, all from the central part of the U. S. —E. Alexander Bergstrom.

MIGRATION

(See also Numbers 8, 10, 48, 53)

11. On the Influence of Experience in the Homing of Pigeons. (Ueber den Einfluss der Erfahrung auf das Heimfindevermögen von Brieftauben.) Hans G. Wallraff. 1959. *Zeitschrift für Tierpsychologie*, **16**(4): 424-444. (With English summary.) More than 20,000 individual flights were made from distances between 10 and 50 km. Homing improved rapidly with experience, mainly due to increasing homing speed. Previous knowledge of the release point proved much less important than general homing experience. Even for short distance orientation topographical features did not constitute essential clues.—M. M. Nice.

12. Homing Behavior of the Homing Pigeon as Conditioned by Place and Time. (Oertlich und zeitlich bedingte Variabilität des Heimkehrsverhaltens von Brieftauben.) Hans G. Wallraff. 1959. *Zeitschrift für Tierpsychologie*, **16**:(5): 513-544. (With English summary.) Results on more than 3,000 individual flights of pigeons on 159 days; 16 release points were used, situated around the home loft at Wilhelmshaven, at distances varying from 10 to 50 km. Twenty-three figures illustrate the findings which are reported in great detail. "The demonstration of local and temporal variations in homing behaviour shows (supplementary to other findings) that visual landscape orientation and celestial orientation are not sufficient to explain the homing ability."—M. M. Nice.

13. The influence of different factors on the performance of homing pigeons. (Über den Einfluss verschiedener Faktoren auf die Heimkehrleistung von Brieftauben.) Klaus Hoffmann. 1959. *Journal für Ornithologie*, **100**(1): 90-102. Hoffmann's failure to reproduce results of Matthew's sun-occlusion experiments (see *Bird-Banding*, **30**(3): 186) was but one facet of his work in Britain with pigeons of English and German stocks. Homing speeds in his series of trials over short distances of 11 and 22 km. pointed to six modifying factors. (1) *Age.*—His pigeons did not attain full homing ability until 4 months old. (2) *Experience.*—Performances of old and young birds alike, released each time over a different course, improved up to their third flight, then levelled off. (3) *Practice.*—After 11 months of inactivity, experienced homers did as poorly as inexperienced birds. (4) *Genetic heritage.*—Pigeons of the transplanted German strain performed slightly but significantly better than those of English stock. (5) *Directional effect.*—Near Cambridge, birds homed faster from the north than from the south and from the east than from the west, in sharp contrast with experience in Germany and North Carolina, where releases from the south have tended to fare best (*cf.* reviews in *Bird-Banding*, **30**(4): 237-238). (6) *Loft*

location.—Homing speeds for Cambridge compared with those for four German lofts ranked fourth and supported the idea that orienting forces vary locally.

These factors create further complexity by seeming interaction. For example, improvement with experience, no longer evident at Cambridge after the third flight, continued at a German locality until beyond the tenth flight, while at one loft in North Carolina experience seemed to exert no influence at all. Hoffmann suggests that effects of training vary with local differences in the orienting stimulus.

The older literature often stressed distinctions between proximal orientation and distance orientation. Many contemporary investigators seem to have abandoned these distinctions. Diehard proponents of the once ascendant theories of topographic search have cause to decry this shift of viewpoint as premature, to complain that homing data for short distances remain ambiguous. The present paper perhaps too readily assumes that release of a bird each time from a different direction precludes use of landmarks. Whatever their direction, releases at a distance of only 11 km. are all conducted within a circle less than 14 miles in diameter. Since visibility from aloft is extensive and since the reported homing speeds do not guarantee prompt direct-line return, pigeons turned loose from one direction should gain a familiarity with terrain useful in later releases from other directions.

Disinterment of ideas regarding the role of landscape clues in proximal orientation provides simple explanations of results that must otherwise be attributed to mysterious aberrations of an unknown force. The difficulty of topographic orientation should differ from place to place in proportion to the sameness of the country surrounding the home loft. It should vary similarly with the direction of release. Where landmarks are pronounced, homing ability should rapidly mature. Where they are subtle, more prolonged development should be required. So considered, the Cambridge data suggest a situation where a rather thorough working knowledge of terrain within the circle is attainable after release from three directions. Finally, diminished orienting ability after prolonged confinement seems more compatible with dimming memory of specific landmarks than with loss of the capacity to react to some unidentified universal stimulus. Doubtless Hoffmann has sound reasons for rejecting a topographical explanation, but he has not divulged these reasons.—R. J. Newman.

14. An audio technique for the study of nocturnal migration of birds. Richard R. Graber and William W. Cochran. 1959. *Wilson Bulletin*, **71**(3): 220-236. To the growing arsenal of instruments available for attack on the problems of nocturnal migration, Graber and Cochran have added an important new weapon, perhaps even a revolutionary one. They have transformed a widely held dream into reality by devising apparatus to record flight calls of passing birds automatically. Detailed instructions and diagrams explain how to hook up the essential items, which are a parabolic reflector, a microphone, an amplifier and a tape recorder.

The new development remedies two previous shortcomings of the auditory method of migration study. It relates the number of calls to a space of known dimensions and permits detection of these sounds from as high as 2 miles aloft, more than five times the range of the unaided ear! At the same time, it much increases an existing advantage of the aural method, the relatively high proportion of night migrants that can thereby be identified to species. No longer must the listener be content with hurried judgments; he now can have a lasting record not just of the number of sounds but of the sounds themselves—one that he can study and restudy at leisure and in critical cases even analyze by playbacks at retarded speed.

The contradictory evidence supplied in America by ordinary flight-call counting on the one hand and moon-watching on the other makes the achievement of Cochran and Graber doubly intriguing. Once, the assumption that most of the birds seen against the moon were flying too high to be heard seemed to account for at least some of the nonconformity. However, sample results obtained with the long-range apparatus and used to illustrate this paper resemble those previously revealed in this hemisphere by ordinary flight-call counting. A proper review of Cochran's and Graber's actual findings must await the scheduled publication of more complete data in a second paper.—R. J. Newman.

15. Song and Tree Sparrow weight and fat before and after a night of migration. Carl W. Helms. 1959. *Wilson Bulletin*, **71**(3): 244-253. Most published work on fat deposition in migrants has come from the laboratory. Helms has attacked the problem out-of-doors. His mean morning weight for 66 Song Sparrows netted on Plum Island, Mass., on April 5, 1958, was 1.41 grams heavier than his morning mean for 44 individuals on April 6. The average for 7 Tree Sparrows captured on April 5 was 1.15 grams greater than for 4 on April 6. In both cases, fat assessed by external examination also decreased. Roadside counts on the two days indicated a drop in Song Sparrow population from 5000 to 2000; and isolated flight calls, not identified to species, were heard during the early part of the night. From these data Helms decides that the energy reserves are greater in these sparrows prior to a migratory flight than after and that the birds show true migratory preparation involving increased fat deposition.

An interesting question arises. If the birds trapped on April 5 could have been caught again on the 6th, would they have averaged heavier or lighter than the sample actually examined on the 6th? Standard errors and standard deviations do not supply the answer. It obviously depends upon what the sparrows of the initial sample did in the intervening 24 hours. If they merely moved across the Merrimack River into Salisbury Township and resumed feeding, they might have been heavier than ever next day. That they could not have done so rests on the unproved assumption that Tree and Song Sparrows are mainly night migrants. In other words, the true meaning of any single set of "pre-flight" and "post-flight" weight data would seem to depend in important part on the unknown history of the movements in question.

Helms' discussion does not take up these matters. It turns its attention to the idea that two patterns of fat variation exist among emberizines and to instructions for sexing by inspection of the cloacal protuberance.—R. J. Newman.

16. Forty Years of Spring Migration in Southern Connecticut. Aretas A. Saunders. 1959. *Wilson Bulletin*, **71**(3): 208-219. Even in these days of many-sided technical research on migration, plain old-fashioned date-listing still has a great deal to contribute. Few ornithologists have devoted themselves so long and so faithfully to the latter activity as Aretas Saunders, whose records span more than four decades. This paper presents many of his data in tabular and graphic form and uses them chiefly to show how much the spring arrival time of 50 selected summer residents varied from year to year. At the one extreme, the species average was 5.38 days late in 1917; at the other, 6.15 days early in 1938. These figures fit an interesting long-term trend. The period of 1902 to 1934 had 15 springs of late arrival and seven early ones in contrast to only three late but 12 early from 1935 to 1949.

Saunders does not discuss the possible reasons for this trend, except to mention an abortive attempt to correlate migration with the growth of trees. Nor does he explain why he chose periods of unequal length for comparison. The dividing point happens to coincide with the beginning of a new era in field identification, marked by the publication of Peterson's *A Field Guide to the Birds* and Saunder's own *A Guide to Bird Songs*. Since the present paper incorporates an unspecified number of records by others, the increasing efficiency of observers could have had a bearing on the results. So too could the fact that the author moved three times during the study and was closer to the zone of heavy land bird migration in New England during the latter years. Saunder's failure to comment on these factors, though unfortunate, is perhaps reasonably good assurance that they were of little real importance.—R. J. Newman.

17. Migration at Ithaca in Spring 1958. I. C. T. Nisbet. 1959. *Kingbird*, **8**(4): 102-104. Here an experiment in the study of migration by ordinary field observation seeks answers to two main questions: (1) whether reliably comparable results can be obtained by different observers; (2) whether the number of migrants in a typical inland woods fluctuates markedly with changing weather conditions. On 29 mornings in the period of April 29 to May 27, seven observers took turns making 1- to 1½-hour counts of the birds in a 60-acre mixed forest. A table gives the results for the 19 commonest migratory species. Dr. Nisbet tentatively concludes that counts by different observers "can be compared reasonably well from day to day." He stresses evidence that immigration occurs almost daily during May but recognizes six well-marked waves. Four of these were of the arrested type, in the face of a cold front.

As brief and modest as this paper is, it deserves comment. One can heartily concur with the author's hope that further investigations of these matters will be widely made by others. But this study is not an ideal prototype. By trying to do two things at once, it achieves neither in an entirely clear-cut way. The variations in the number of migrants remain inextricably mixed up with potential variations due to observers. A far better plan would have been to use two independent checkers each day. Then we might have had a real measure of the error resulting from different observational abilities. Nisbet did obtain dual counts on one date but failed to report the outcome in numerical terms.

Unpublished studies of winter bird censuses designed to isolate observational variables and to test their relative importance have indicated that the problems of correctly analyzing bird counts are much more complex than the present report suggests. Even in the case of the relatively static populations of winter, one-hour counts have proved highly unreliable. The significance of results tends to be directly proportional to the numbers of birds seen, modified by their tendency to aggregate in flocks of a single species; it cannot be reduced to Nisbet's simple formula that variation by a factor of 2 is meaningful. A count of 2 birds versus a count of 1 has next to no significance; a count of 20 versus a count of 10 has a great deal more.

These remarks should not discourage field observers of migrants. Rather they should point out to them an unexploited opportunity to add new zest to their activities and to provide new knowledge by simultaneous counting with planned variations in technique.—R. J. Newman.

18. Calculations of flight directions of birds observed crossing the face of the moon. I. C. T. Nisbet. 1959. *Wilson Bulletin*, **71**(3): 237-243. The procedure outlined is an ingenious adaptation of principles laid down by Lowery and Rense, originators of the modern method of studying migration by means of the moon. The first of several such adaptations to be described in print, it has the advantage of requiring no special apparatus and no mathematical knowledge on the part of the user beyond the ability to add, subtract, divide, and multiply. Its claim to increased accuracy is more debatable.

No way exists of determining the true track of an *individual* migrant from its recorded path across the moon. The most rigorous solutions possible are subject to large irremediable errors from at least three sources. Both the system currently employed at the Louisiana State University processing center and the Nisbet method tolerate in addition a measure of avoidable inaccuracy. To state the matter in simplified form, L. S. U. analysts use precise correction factors for approximate altitudes and azimuths of the moon, while Nisbet prescribes approximate correction factors and more precise altitudes and azimuths. In some circumstances the latter combination unquestionably yields somewhat superior rigor, but it purchases this advantage at an exorbitant cost in time and effort.

The various sources of error referred to act independently and largely at random. Thus, when many individually unreliable directions are combined, errors tend to cancel and more reliable mass directional trends emerge. The proper numerical expression of these trends requires that allowance be made for variation in the size of the sample with direction. Otherwise the north-south trend may, for example, appear as much as three times as great as the east-west trend though actually inferior. Quantitative correction is as essential to sound directional analysis as qualitative correction.

Nisbet fails to make this relationship clear. His entire exposition of the procedure to follow after calculating the directions of individual birds is condensed into 17 lines. These latter instructions are incomplete and uncertain in meaning; the quantitative correction factors differ, for no expressed reason, from those already in use; and the table of factors is so brief that reliable interpolation is impossible. Thereby the extra accuracy demanded in the early phases of computation is in the end thrown away. Worse still, to justify these shortcomings, the paper uses erroneous citations and doubtful reasoning in an effort to show that the standard correctional system "cannot be quantitatively accurate."—R. J. Newman.

19. The Influx of Phalaropes in Autumn, 1957. Bryan L. Sage and Bernard King. 1959. *British Birds*, **52**(2): 33-42. Red Phalaropes *(Phalaropus fulicarius)* and Northern Phalaropes *(Lobipes lobatus)* were recorded in "more

than average numbers" in the British Isles during the autumn migration of 1957. Detailed listings of all occurrences are given on a vice-county by vice-county basis. These records are analyzed on a monthly basis and compared with similar figures for an earlier influx in 1950. Correlations of the peak of phalarope appearances in September 1957 with the passage of weather systems are shown. In the early part of the month, good weather prevailing over much of Greenland allowed migration to get off to a good start. Birds of both species were probably windborne directly from Greenland by northwesterly winds that occurred in the southwestern quadrants of northeast-moving low-pressure areas. A secondary peak developed later in the month when easterly winds prevailing between Britain and Greenland mitigated against the possibility of a direct Greenland origin for these birds involved. This second influx was correlated with a small but intense low-pressure area from the direction of the Azores. It is suggested that this depression may have picked up phalaropes *en route* in its path, carried them along in its calm center or "eye," and dropped them upon its arrival in Britain. —Stuart L. Warter.

20. Watching Migration by Radar. David Lack. 1959. *British Birds*, **52**(8): 258-267. After a brief history of bird detection by radar, 8 photographs of migration shown by radar are given, as well as 3 maps showing different types of migration. The main ornithological findings are discussed under 11 paragraphs. One of these is that much migration is carried out too high to be detected by human vision. Also, "the direction of migrants flying within visible range is sometimes different from that of birds migrating high up." Bird migration is a vastly complicated business.—M. M. Nice.

21. The migration of the Redstart and the Black Redstart as shown by band returns. (Der Zug von Hausrotschwanz *(Phoenicurus ochruros gibraltariensis)* und Gartenrotschwanz *(Ph. phoenicurus)* nach Beringungsergebnissen.) Christine Hempel and Waltraud Reetz. 1957. Die Vogelwarte, **19**(2): 97-119. This paper compiles 1876 German band returns, of which 223 are distant returns of Redstarts and 147 of Black Redstarts, as well as some material from other bandings. Most individuals of both species migrate southwest from their breeding grounds in central Europe through France, Spain, and Portugal to the wintering grounds in Africa. Although 226 migration returns of the Black Redstart were from the southwest, 19 showed migration to the southeast. Southeastward migrating Redstarts *(P. o. gibraltariensis)* do not originate in a different breeding area; both groups follow the same paths in spring and fall, as do both species. The northern populations of Black Redstarts leave the breeding grounds earlier, but do not reach France, Spain, and Africa earlier than do the central populations. Maps show breeding and wintering areas and fall and spring migration. The almost 13 pages of data on individual band returns are an impressive compilation.—Frances Hamerstrom.

22. On the migration of Titmice banded in Bretolet Pass in the Fall of 1957. (Sur la migration des Mésanges baguées au col de Bretolet en automne 1957.) Paul Géroudet. 1959. *Nos Oiseaux*, **25**: 60-61. A brief report, with a map, of the banding recoveries received from 3968 Titmice of 3 species *(Parus major, P. caeruleus* and *P. ater)* banded in Bretolet Pass. The maximum distance traveled by one of these birds was 760 km. northwest *(Parus major)*. Most of the recoveries were from the south or southwest from the Rhone Valley.—R. O. Bender.

23. Mortality at the Dow Air Base Ceilometer. Richard L. Ferren. 1959. *Maine Field Naturalist*, **15**: 113-114. On the night of August 30-31, 1959, mortality at this airfield (near Bangor, Maine) involved at least 45 birds of 16 species. Again on the night of September 30-October 1, at least 32 birds of 11 species were involved.—E. Alexander Bergstrom.

POPULATION DYNAMICS

(See Numbers 2, 7, 34, 43, 47)

NIDIFICATION AND REPRODUCTION

(See also Numbers 47, 57)

24. The Nesting of Birds in the Nests of Social Insects. K. A. Hindwood. 1959. *The Emu*, **59**(1): 1-36. All too little attention has been paid to the interesting symbiotic relationship between certain birds and social insects. The author focuses attention on it in this fine dissertation based on his own observations and a thorough review of the literature (bibliography of more than 100 titles).

Two species of woodpeckers nest occasionally in ants' nests, and while many species of birds nest near wasps, ostensibly for protection from mutual enemies, the only species that actually builds in wasps' nests is the Gartered Trogon of South America. A total of 49 species of birds are known to use termites' nests for their nesting sites. These include 23 kingfishers, 13 parrots, 4 woodpeckers, 4 trogons, 2 puffbirds, a jacamar, and a cotinga. Hindwood gives the details for each and all of these in his annotated list and points out the many advantages that termite nests offer to hole-nesting birds, such as ease of excavation, protection, maintenance of constant temperature and humidity conditions, and possible protection from enemies.

The trait seems largely limited to hole-nesting birds, and to those that dig out their own nesting hollow. It is particularly well developed in the kingfishers, no less than 25 percent of the known species having adopted it to some degree. Perhaps of significance is its occurrence only in rather primitive arboreal birds—parrots, trogons, coraciids, picids, and one cotinga. The few higher types that have been found nesting in such situations, the House Sparrow and the Starling for instance, have appropriated nests dug there by other species, usually by kingfishers. The habit is obviously worth a great deal more study, and Hindwood's paper lays an excellent groundwork for future work on the subject.—O. L. Austin, Jr.

25. The Internal Rhythm of Reproduction in Xerophilous Birds under Conditions of Illumination and Darkness. H. A. Marshall and D. L. Serventy. 1958. *Journal of Experimental Biology*, **35**(3): 666-670. Two residents of the dry grass and scrub lands of central Australia, the Budgerygah *(Melopsittacus, undulatus)* and the Zebra Finch *(Poethila castenotis)*, have developed a peculiar adaptation to their environment in being "opportunist breeders." Instead of nesting cyclically in response to light or season, they breed irregularly during the infrequent wet spells when conditions are more propitious for them to rear their young. The authors question the widely quoted conclusions of Vaugien (1952, 1953) whose experiments with Budgerygahs led him to believe that in this species spermatogenesis is produced more readily in total darkness than in light, which they believed to be a misinterpretation of his results. Their experiments on the Zebra Finch show that "various conditions of illumination (including decreasing photoperiods) cause in both sexes greater gametogenetic activity than occurs in darkness." They conclude that "the rapid production of spermatozoa (within 60 days) is in both parrot and finch a physiological aspect of drought adaptation enabling very young birds to reproduce quickly whenever environmental conditions are propitious," and comment that "the males at least of both Zebra Finch and Budgerygah retain an ancestral capacity to respond to photostimulation. But under natural conditions any such tenacity would be often over-ridden by external inhibiters that are significant to reproductive success."—O. L. Austin, Jr.

26. Changes of Mating Within a Colony of Arctic Skuas. Kenneth Williamson. 1959. *Bird Study*, **6**(2): 51-60. This excellent study of the pairing of Parasitic Jaegers *(Stercorarius parasiticus)* made with the help of both numbered and colored bands in the Fair Isle colony shows certain aspects of the breeding behavior in the Stercorariidae closely parallel those of the several species of Laridae that have been adequately studied. The jaegers breed for the first time between the ages of 3 and 5 years, and the birds develop mating stability with age. The most unstable matings are those of birds breeding for the first or second time, "probably because a high proportion of the younger individuals are slow to attain breeding condition and tend to return late to the colony, to find that early returning partners of the previous year have already been at-

tracted to older birds in quest of a new mate. With old established birds the return and attainment of breeding condition are closely synchronized and such partnerships continue unbroken for many years. 'Divorce' among experienced birds is rare (a case is recorded) and a change in partnership normally implies the failure of the regular mate to survive the winter at sea."—O. L. Austin, Jr.

27. Wood Lark Territories. C. J. O. Harrison and J. Forster. *Bird Study*, **6**(2): 60-68. Describes the limits and vegetation of the nesting territory of a pair of *Lulula arborea* on the grounds of a private school in Surrey. Changes in the location of the nest and its surrounding territory from year to year suggest that it is the ecological "suitability of the area rather than the persistence of a particular pair that is responsible for its use in successive years." The birds occupy the territory for 6 weeks before nesting, at which time the territory covers about 28 acres. "After incubation commenced, the cock maintained only a smaller territory in the vicinity of the nest which amounted to a minimum territory of 12.1 acres."—O. L. Austin, Jr.

28. On the Breeding Biology of the Barn Swallow. (Over be Broedbrologie van de Boerenzwaluw *(Hirundo rustica* L.).) P. Herroelen. 1957-1959. *Le Gerfaut*, **47**(2): 115-126; (4): 265-278; **49**(1): 11-30. From the French summary.) Analyzes the extensive data obtained by the author during a 5-year investigation of some 80 nests of the Barn Swallow in Belgium. The author's findings largely corroborate facts already recorded for the species. Both sexes build the nest, which takes 1 to 2 weeks. Incubation by the female alone averages 14 to 15 days, but extremes of 12 to 18 days were recorded. Both sexes feed the young, which usually leave the nest at an age of 20 to 21 days with extremes of 16 to 24 days. The young return to the nest to spend the night for the first 10 or 15 days after leaving. Observations on banded birds showed year-old females returning for the first time arrive later than the older birds, and nest later with a lower degree of nesting success. Usually each pair raises two broods annually, with laying peaks in May and July. Older birds occasionally raise three broods. Later clutches average slighty smaller than the first ones, but show no significant differences in percentages of young hatched and reared.—O. L. Austin, Jr.

29. The Shelduck *(Tadorna tadorna* (L.)) in Denmark, with Special Reference to Inland Breeding. (Gravanden *(Tadorna tadorna* (L.)) i Danmark. Med saerligt henblik på yngleforekomster inde i landet.) C. M. Poulsen. 1959. *Dansk Ornithologisk Forenings Tidsskrift*, **53**(3): 155-169. (From the English summary.) With full protection since 1931 the Shelduck has increased steadily as a breeding species along the coasts of Denmark. It is now fairly common and is increasing its breeding range to the shores of inland freshwater lakes. Shelducks nesting on ponds near the coast take their young to salt water soon after hatching. Those farther inland rear the ducklings on the nearest large lake. The birds often nest in deserted fox or badger dens.—O. L. Austin, Jr.

30. Notes on the family life of a Wryneck. (Ur göktytans familjeliv.) Bertil Hanström. 1959. *Fauna och Flora*, (1-2): 1-8. Close observation of a nesting pair of Wrynecks *(Jynx torquilla)* revealed interesting habits. The male Wryneck usurped the nestbox of a pair of Great Tits *(Parus major)* by throwing out their eggs and bedding. The female appeared later, took scant notice of the new nesting facilities and gave the male no assistance in cleaning out the premises, which took 3½ days. When danger threatened, like a flash the male flew into the box and defended it from within. This maneuver gave him strategic advantage over a Starling *(Sturnus vulgaris)* which once made persistent efforts to take over the box. On the day of emergence the parent Wrynecks put pressure on the young to leave the nest cavity in various ways.—Louise de K. Lawrence.

31. Test of an Automatic Nest-Recorder. Tomoo Royama. 1959. *British Birds*, **52**(9): 295-302. A description, illustrated by a sketch, of a recorder in which an iron-detector makes a different mark on the tape at the comings and goings of the parent bird provided with iron rings on its legs from that made for the other parent. Information is presented in figures and tables of the results obtained during the last 5 days before fledging of the 7 young of a pair of Great Tits *(Parus major)* in Fuji, Japan. Data are analyzed for feeding frequencies,

daily rhythms, durations of periods at the nest, times of the first and last visits each day, and the hours at which the young left.— M. M. Nice.

32. Blue Tit Feeding Young Treecreepers. N. J. Antoine. 1959. *British Birds*, **52**(12): 432-433. The young in a nest of *Certhia familiaris* hatched 13 May; on 15 May a male *Parus caeruleus* nesting 2 feet distant was assisting in the feeding of the Treecreepers. Ten days later he was still feeding the neighbor chicks while his mate was carrying food regularly to baby Blue Tits. During the next 3 days the male Blue Tit fed the Treecreepers even more frequently than did their parents; he brought "exclusively small green caterpillars," while they brought moths and craneflies. He was seen to feed each of the 4 Treecreepers out of the nest on 29 May, then took complete charge of the two still in the nest. He "entered the nest and gave it a thorough clean, throwing debris out at the front and chattering away volubly all the time." His mate continued to care for her young. On 30 May the last Treecreepers had flown; the Blue Tits left between 8 and 12 June. It is a pity that the Antoines did not note the behavior of this confused father Blue Tit after the leaving of his neighbors' brood.—M. M. Nice.

33. Noteworthy observations of breeding biology (in) 1958. (Bemerkenswerte brutbiologische Feststellungen 1958). Gerhard Creutz. 1959. *Ornithologische Mitteilungen*, **11**: 29-31. Among the observations recorded from the Neschwitz sanctuary the following will be of interest to readers of *Bird-Banding*. A banded male Redstart *(Phoenicurus phoenicurus)* helped feed the 6 young hatched by one female, then fed the young (number not stated although there were 7 eggs) from a second nest about 90 m. distant and finally helped to raise a third family with the first female. Several instances of Cuckoo eggs in Redstart nests are also reported, but these were deposited on the edge of the nest and, hence, were not incubated. Creutz also reports on the recovery and behavior of a White Stork *(Ciconia ciconia)* which lost most of one foot in a steel trap, as well as on a 9-egg clutch for this species. No evidence could be found for the presence of a second female.—R. O. Bender.

34. Observations on the loss of bird broods. (Beobachtungen über die Verlustquote bei Vogelbruten.) Hans Hudde. 1959. *Ornithologische Mitteilungen*, **11**: 149-52. Observations of 1009 broods made over the period of 1949-1958 in the vicinity of Essen are presented. The data represent 63 different species and are tabulated by biotope and by nest type. Average loss was close to 30 percent, but this figure is low because not all broods were followed to departure of the young. The data are of interest but are not sufficiently complete to permit a conclusion regarding true nesting success.—R. O. Bender.

BEHAVIOR

(See also Numbers 24, 26, 27, 30, 32, 62)

35. Imprinting. Eckhard H. Hess. 1959. *Science*, **130**(3368): 133-141. An excellent summary of the subject, its history, and a brief account of the author's own experiments. Table 2 lists the number and imprintability of the animals Dr. Hess and his students have used: some 5700 ducks, geese, chickens and other galliforms, 2 sheep and 12 guinea pigs. These are rated from excellent + (wild Mallard and Canada Geese) excellent, good +, good, fair, and poor (Wood Duck, Leghorn chicks). After pointing out that the animals used by certain other investigators have been too old for imprinting, "with the result that only association learning can occur," the author concludes as to the general nature of imprinting: "Our best guess is that it is a rigid form of learning, differing in several ways from the usual association learning which comes into play immediately after the peak of imprintability."—M. M. Nice

36. Color Preferences in Imprinting Objects. Helmuth H. Schaeffer and Eckhard H. Hess. 1959. *Zeitschrift für Tierpsychologie*, **16**(2): 161-172. Colored spheres of 7" diameter were presented as imprinting objects to Vantress broiler chicks of White Rock stock at the critical ages of 13 to 16 hours; the stimuli for eliciting following ranged in effectiveness in this order: blue, red, green, orange, grey, black, yellow, white. This order bears an inverse relationship to that followed for food preferences.—M. M. Nice

37. Innate Behavior Patterns as Indicators of the Critical Period. Eckhard H. Hess and Helmuth H. Schaeffer. 1959. *Zeitschrift für Tierpsychologie*, **16**(2): 155-160. In an attempt to analyze various innate behavior patterns, 124 chicks from 1 to 44 hours old were observed for 2 minutes and the emission of distress notes, contentment notes, approaching a stimulus, fixating a stimulus, and remaining silent were recorded. The "ratio of animals showing these behaviors at different ages completely reverses itself by the time the anima's are 21 hours old; the most marked change takes place from the 9th to the 20th hour after hatching." —M. M. Nice.

38. Development of the Young, Breeding Biology and Comparative Ethology of Waders. (Zur Jugendentwicklung, Brutbiologie und vergleichenden Ethologie der Limicolen.) Otto v. Frisch. 1959. *Zeitschrift für Tierpsychologie*, **16**(5): 545-583. (With English summary.) Careful, detailed observations on 13 species of waders raised in small heated indoor aviaries and on adult birds in large outdoor aviaries with natural growth and abundance of water. All the chicks found their own food from the start except the Oystercatchers *(Haemotopus ostralegus)*, Snipe *(Capella gallinago)* and Stone Curlew *(Burhinus oedicnemus)* which fed for a few days from the forceps. It was only with these three species and the Avocets *(Recurvirostra avocetta)* that the chicks of a brood stayed closely together. A 2-day old Avocet tried to brood one of its brothers, and at 14 days it adopted two baby Water Rails *(Rallus aquaticus)* and brooded them for the next 2 weeks.

Preening, stretching, and bathing movements of the adults are very much alike, differences occurring in those species with long bills. Most of the birds showed the following threat attitudes: head and bill held high signified a readiness to flee; head and bill held low meant a readiness to attack. Fifty photographs and sketches illustrate this fine paper.—M. M. Nice.

39. Notes on the Behavior of Some North American Gulls. IV. The Ontogeny of Hostile Behavior and Display Patterns. Martin Moynihan. 1959. *Behavior*, **14**(3): 214-239. Detailed description of notes and postures (illustrated by sketches) of chicks of Franklin's and Ringbilled Gulls *(Larus pipixcan, L. delawarensis)* raised at the Delta Waterfowl Research Station at Delta, Manitoba, these observations being supplemented by watching families on the marsh. The author states: "All or most of the display movements and postures of gull chicks eventually become associated with hostility, like the vocalizations, and it is not surprising, therefore, that almost all the originally flexible patterns from which they are derived seem to be hostile movements or intention movements, or the simple locomotory patterns produced by the activation of the hostile drives."

My daughter and I raised Franklin's Gulls at Delta from 1951-53, and in 1954 we saw much of Dr. Moynihan's gulls. At first he kept the Franklin's isolated, but later they had the freedom of the "Gull Yard." We had kept our gulls well fed and we never saw any friction between individuals that had grown up together, nor any pecking of strange young chicks. Dr. Moynihan's gulls on the contrary were fed at long intervals; they abused the youngest of the group and attacked a wild-caught member of the species slighty older than they. They were also unusually belligerent towards other species, including on many occasions, human beings. We believe that these gulls developed hostile attitudes to an exaggerated degree and did not present a normal picture.—M. M. Nice.

40. Photographic Studies of Some Less Familiar Birds. C.—Ruff. Photographs by C. C. Doncaster and J. B. and S. Bottomley. Text by N. Tinbergen. 1959. *British Birds*, **52**(9): 302-306. Seven fine photographs taken in Jutland of *Philomachus pugnax* in display. Dr. Tinbergen discusses the photographs and also the observations of 8 ornithologists, particularly those of Selous (1906-07), comparing the postures with those of other Laro-Limicolae that have been recently studied. Females show preference for the more conspicuously marked and dominant males. "It is interesting to see how on the one hand the Ruff is a typical wader, and how on the other it has specialized as an arena bird and developed certain traits (extreme sexual dimorphism, social courtship, males mere 'sperm carriers' with a mating territory and possessing unusual sexual vigour, females choosing) which are very similar to the characteristics of other arena birds."—M. M. Nice.

41. The calls and displays of Owls. (Ugglornas spelvanor.) Jens Wahlstedt. 1959. *Fauna och Flora*, **3-4**: 81-112. Patient study during many nights spent in the wilderness in late winter and spring over several years yielded the data contained in this remarkable account of the little-known habits of this group of raptors. The seasonal and daily rhythms, the influence of the weather on behavior, reactions to imitations, the differences between male and female call notes are discussed for six species: the Pygmy *(Glaucidium passerinum)*, Boreal *(Aegolius funereus)*, Long-eared *(Asio otus)*, Short-eared *(Asio f. flammeus)*, Tawny *(Strix aluco)*, Great Gray *(Strix nebulosa)*, and Ural *(Strix uralensis liturata)* Owls.

The most intensive owl calling occurs from dusk to midnight and at dawn. It varies in the different species. The Boreal Owl, for instance, is a decided night-caller, starting at the height of the season an hour after dusk and continuing practically without interruption all night, while the Pygmy Owl is exclusively a dawn musician. The calling of the owls is well synchronized with the activity of their prey animals, voles and mice, which are easier to see on moonlit or light nights and more in evidence towards the spring when the weather gets better and warmer.

During the breeding season the females use much the same calls as the males, and only the experienced observer with a fine ear can distinguish between them, those of the females sounding "tamer," less clear of tone. The females and the young have also their own specific notes. The author's phonetic rendering of the calls is helpfully realistic.

Owls react quickly and often aggressively to imitations of their calls. This inclination facilitates census-taking and territory-mapping, as well as the study of behavior, since the owls can be "called out" almost at will. By this device the author was able to witness the matings of the Boreal and Tawny Owls. Hovering on rapidly beating wings, the male sank down upon the female, whereupon both broke into a chorus of wild calling interrupted by weird hissing and wailing noises and accompanied by wing-clapping and bill-snapping. The Long-eared and Short-eared Owls also have special flight displays. They feature ritualized rising into the air to the accompaniment of continuous loud calling, diving, wobbling flights around the treetops, and "applauding" at which the wings are brought together under the belly with a resounding smack. The lack of a good English summary of this fine behavior study is regrettable.—Louise de K. Lawrence.

42. The fearless Grasshopper Warbler. (Den orädda gräshoppsångaren *(Locustella naevia)*. Knut Eklund. 1959. *Vår Fågelvärld*, **18**: 215. An excellent series of photographs with captions worthy of note. At the approach of a weasel the bird gave loud alarm notes, vigorously flapped its wings and flicked its tail sideways, then pursued the enemy in "wobbling" flight. The song is a continuous sibilant undertone with a sharp churring overtone of "indescribably high pitch," at intervals interrupted by nearly inaudible hiccough-like notes. This warbler ignores man's presence and may walk over his feet or perch on his hand with utmost indifference. It was first observed in mid-Sweden in 1946, but not until 1955 was breeding proved.—Louise de K. Lawrence.

43. Knowledge of the daily activity of Titmice of the genera Parus and Aegithalos. (Zur Kenntnis der Tagesaktivität de Meisen de Gattungen Parus und Aegithalos.) Jiri Felix. 1958. *Sylvia* **15**: 5-21. (From review by H. Bruns in *Ornithologische Mitteilungen*, **11**: 37.) Based on observations made near Prague in a mixed woodland from Nov. 1951 to the end of May 1953, the author reports that outside of the nesting time individual Great Tit and Blue Tit *(Parus major and P. caerulaes)* use an area no greater than 10 hectares in extent. Flocks use areas of 10-70 ha. The travel of a flock of Tits during an 8-hour day amounted to more than 3000 m., of individuals of pairs about 1500 m. Individual Tits moved at a velocity of 200 meters/hr., flocks about twice as fast. On the average, 86 percent of the day was spent in seeking food, 5 percent in preening, 5 percent resting and 10 percent in various other activities. From 16 July 1952 to 23 Jan. 1953, a flock of Longtailed Tits suffered mortality losses of 73 percent (excluding nestling deaths), principally to Hawks and Owls.—R. O. Bender.

44. Starlings flocks and birds of prey. (Starenschwärme und Greifvögel.) Wilhelm Zedler. 1959. *Ornithologische Mitteilungen*, **11**: 128-30. An interesting discussion of the manner of attack employed by Starlings on hawks as observed at the Neusiedler See. Attacks were observed on Harriers (probably only the Marsh Harrier *(Circus aeruginosus)*), the Kestrel and Lesser Kestrel *(Falco tinnunculus* and *F. naumanni)* and the Common Buzzard *(Buteo buteo)*. The author observes that these are all hawks that take their prey on or near the ground and comments that he had not observed Starling attacks on hawks which take their prey in the air. He also points out that it is proper to speak of attack rather than defense according to his experience.

Two kinds of attack maneuvers are reported. With very large flocks, 1000 or more, the Starlings fly with less organized precision and appear to "cover" the hawk for minutes at a time. With smaller flocks, 100 or less, the birds move more as a unit and the attacked bird is "taken in the middle." The hawks when attacked did not exhibit notable reaction; no attempt to seize one of the attackers was seen. They simply flew out of the area. Zedler suggests that the presence of such a mass of birds effectively occupying much of the hawk's field of vision generates a psychological pressure that compels it to flee.—R. O. Bender.

WILDLIFE MANAGEMENT

(See also Numbers 46, 50, 51)

45. Protecting Pine Buds against the Attacks of Black Game. (Bescherming der Dennenknoppen Tegen de Aanvallen van het Korhoen, *Lyrurus tetrix* (L.).) L. Nef. 1959. *Le Gerfaut*, **49**(1): 53-58. (From the French summary). The Black Game causes considerable damage to young plantations of pine on the heath lands of Belgium by nipping off the young shoots. The various chemicals commonly used to protect farm crops against damage by crows proved ineffective, but dusting the young trees with lime gave them complete protection against the birds' depredation at far lower cost.—O. L. Austin, Jr.

PHYSIOLOGY AND PSYCHOLOGY

(See Numbers 15, 25, 36, 46, 62)

MORPHOLOGY AND ANATOMY

46. Observations on the Cloacal Gland of the Eurasian Quail, *Coturnix coturnix*. William H. Coil and David K. Wetherbee. 1959. *Ohio Journal of Science*, **59**(5): 268-270. The authors describe a gland they discovered embedded in the dorsal lip of the cloaca of male *Coturnix*, which secretes a frothy fluid frequently visible on the cloaca and in the birds' droppings. They believe the secretion to be "associated with the mechanics of internal fertilization," perhaps as a lubricant. Their anatomical studies also revealed a small penis-like structure on the ventral wall of the cloaca, the first time such an organ has been reported in gallinaceous birds.—O. L. Austin, Jr.

47. Bills, Eggs, and Nests of Captured Arctic Terns *(Sterna paradisaea* Pont.) and Common Terns *(Sterna hirundo* L.). F. Søgaard Andersen. 1959. *Dansk Ornithologisk Forenings Tidsskrift*, **53**(2): 84-100. With English and Danish summaries). This paper is largely a statistical analysis of series of measurements of bills and of eggs of Common and Arctic Terns made between 1940 and 1948 in a mixed colony of the two species on the Tipperne Sanctuary near the west coast of Denmark. While the means of the bill lengths of the two species differ significantly, the measurements overlap so widely that length is not a reliable specific character. The author notes that about one-third of the Arctic Terns have a small black tip to the bill, which "seems to be due to incomplete shedding of the winter sheath of the bill, and this in turn seems to be most frequent among young birds." It is never as pronounced as the extensive black tip in all breeding Common Terns.

The eggs of the two species are practically identical in length, but those of the Arctic Tern are significantly smaller in mean breadth than those of the Com-

mon Tern. Comparison with data from Arctic Terns nesting in eastern Greenland suggests the Danish Arctic Terns lay slightly larger clutches of slightly larger eggs than the Greenland population.

Banding data from nesting adult Arctics show distributional patterns similiar to those exhibited by the Common Terns on our New England coast. The birds show strong fidelity to their nesting sites, moving very slightly, if at all, from year to year. The farthest movement was 2 kilometers from a previous site. The oldest Arctic Terns captured on their nests were 14, 10, and 10 years old respectively.—O. L. Austin, Jr.

ZOOGEOGRAPHY

(See also Numbers 1, 3, 8, 27, 28, 42, 43, 47, 64, 65, 66)

48. On the breeding distribution pattern of North American migrant birds. Robert H. Mac Arthur. *Auk*, **76**: 318-325, 1959. This paper presents information on the pattern of breeding distribution of Nearctic birds which migrate into the Neotropical region (the American continent south of the United States, including the West Indies but excluding the Mexican highlands). The species of migrants (neotropical migrants) considered are largely insectivorous passerines which breed in undisturbed climax vegetation. These relatively stable habitats are "likely to represent the conditions for which the pattern of migration gradually evolved." A basic assumption is that each species returns in spring to such environmental situations as permit it "the greatest output of reproducing progeny." Mac Arthur is one of few workers who have made good use of breeding-bird census data, including those published in *Audubon Field Notes*. A map shows "the proportion of breeding-bird individuals in undisturbed vegetation communities at that community which will migrate out of the Nearctic region in the winter."

Climate alone cannot be correlated in any simple way with the proportions of migrants in the different breeding populations. In general, the proportion of neotropical migrants is highest in the northeastern deciduous forest areas. This proportion diminishes in other areas, such as coniferous forests of the north and (especially) of the west, and becomes almost nil in chaparral, desert, and prairie habitats. "The most reasonable explanation of the pattern . . . is that where change between winter and summer in the supply of food suitable for migrants is greatest, the proportion of migrants is greatest." Moreover, the food increase which governs this proportion of migrants must be predictable (as it is not, say, in many desert areas) and must last long enough to sustain the migrant population during its summer-long sojourn. Spruce-fir forests of northern regions support as breeders relatively more migrants than do pine and redwood forests farther south. The fact that spruce has a greater foliage/wood ratio than pine ties in with the idea that "the insect-eating bird might be expected to comprise only half to two-thirds as large a percentage [of the bird population] in pine as in spruce." Mac Arthur found an interesting correlation with latitude. Thus, "in the northern areas censused, the average abundance of the neotropical migrant species is greater than that of the residents and species which move short distances. . . . On southern areas . . . the tendency is reversed . . . meaning that, on the average, non-migrant species are commoner."

This paper may well stimulate further work. For example, data on the proportion of migrant to non-migrant species and individuals in various regions during migration periods and comparison of such data with those of Mac Arthur would yield information of decided interest.—Robert A. Norris.

49. The Spread of the House Sparrow in Mexico. (Die Einwanderung des Haussperlings in Mexiko.) Helmuth O. Wagner. 1959. *Zeitschrift für Tierpsychologie*, **16**(5): 584-592. (With English summary.) *Passer domesticus* came into Mexico about 1910 both from the northeast and along the Pacific Coast, where it advanced about 200 km a year until it reached the Isthmus of Tehuantepec. The vegetation zones are shown on one map, the progress of the invasion on another. The birds cannot cross really arid areas nor unbroken virgin forest. Very high summer temperatures are a limiting factor, although such regions are repeatedly entered, only to have the population disappear. In hot areas the birds

nest in the winter and spring. Except during grain harvests the birds live almost entirely upon insects.—M. M. Nice.

50. The Decrease of the Corncrake *(Crex crex)*. Lars von Haartman. 1958. *Societas Scientiarum Fennica. Commentationes Biologicae*, **17**(2): 1-29. The marked decrease of the Corncrake in northern Europe in this century is correlated with earlier harvesting of hay and the greatly increased use of mowing machines which destroy the females, their eggs, and small chicks. The report is illustrated with 12 figures and provided with a 3-page bibliography.—M. M. Nice.

51. The Spread of the Eider in Great Britain. 1959. J. H. Taverner. *British Birds*, **52**(8): 245-258. About 100 years ago *Somateria mollissima* began to extend its breeding range in Great Britain. This trend has increased greatly since 1945, along with a striking increase in the winter range. The increase is probably largely due to protection, but "protection could not possibly have been the cause of the original spread from the Western Isles." No satisfactory explanation of this phenomenon is offered.—M. M. Nice.

52. Dispersal of Egrets on the Kanto Plain, Japan. H. Elliott McClure. 1958. *Wilson Bulletin*. **70**(4): 359-371. This study of six species of herons capable of harboring the virus of Japanese encephalitis shows that peak abundance away from colonies near Tokyo coincides with peak infection of mosquito vectors and mammalian hosts. Widespread and even distribution is shown by the increase in the number of flocks but not by their size. Dispersal is assumed from the agreement of production estimates of the Shinhama and Sagiyama colonies with peak figures on the plain obtained from aerial surveys, and the observation of red-dyed birds up to four miles from the colony where marked. However, the existence of additional large colonies along this aerial survey route at Noda and in Chiba City (Austin and Kuroda, 1953) and the well-known extensive post-breeding movement of immature herons detract considerably from this assumption. As McClure states, "This obviously is a very difficult field problem to solve without extensive banding and wide recapture. . . ." Since 1951 only 5000 nestlings have been banded on the Plain and none north of it, with very few heard from. This study certainly demonstrates that in any field study of birds a well-organized, well-distributed, and well-publicized banding organization is well-nigh indispensable.—Thomas A. Imhof.

53. Notes on the Pine Grosbeak and the White-winged Crossbill in Sweden during the invasion period 1956-57. (Om tallbit *(Pinicola enucleator)* och bändelkorsnäbb *(Loxia leucoptera)* i Sverige under invasionsperioden 1956-57). Gunnar Markgren and Stig Lundberg. 1959. *Vår Fågelvärd*, **18**: 185-205. (English summary.) The movements of the two species are discussed in detail and illustrated by several maps. Several hundred Grosbeaks were banded at the northern end of the Gulf of Bothnia and a few Crossbills in mid-Sweden. Recoveries the same year indicated a southwesterly movement by the Grosbeaks at about 10 kilometers per day during January-February and a slow eastward movement of the Crossbills in late February and March. A year later two of the Grosbeaks were recovered in Finland (62° 41′ N, 29° 40′ E). Rowanberries were abundant and devoured by both species, but the staple foods—sprucebuds and flowers for the Grosbeak, larch seeds for the Crossbill—were in short supply. Most of the invasion species stay and breed in numbers wherever food is abundant. Crossbills were found nesting in a larch tree plantation in northern Sweden. The Grosbeaks, however, appear to diverge from this habit and commonly return to their breeding ranges in northern Europe and northeastern Siberia.—Louise de K. Lawrence.

54. The occurrence in Sweden of Redpolls, Siskins, and Yellowhammers in the winters 1957-58 and 1958-59. (Gråsiskans *(Carduelis flammea)*, grönsiskans *(Carduelis spinus)* och gulsparvens *(Emberiza citrinella)* förekomst i Sverige vintrarna 1957-58 och 1958-59.) I. Lennerstedt and S. Ulfstrand. 1959. *Vår Fågelvärld*, **18**: 215-219. (English summary.) Each year a cooperative "Christmas" census is taken in Sweden from 23 December to 8 January. Results, calculated in number of birds seen per field hour, show Redpolls and Siskins notably increased in 1958-59 over the previous year, whereas the Yellowhammers decreased steadily from one winter to the other.—Louise de K. Lawrence.

55. The avifauna 1956-57 of Krankesjön and its environment. (Fågelfaunan i Krankesjön och dess omgivningar år 1956-57.) Staffan Ulfstrand. 1959. *Fauna och Flora*, **1-2**: 9-59. Frequent censuses at the southernmost of Sweden's three famous bird lakes furnished records which clearly contradicted recent assumptions that Krankesjön had lost its importance from the ornithologist's standpoint. Of the 182 species listed, 95 were transients and 86 certain or probable breeders. Only one, the Bittern *(Botaurus stellaris)*, although found at this lake in the past, was missing.—Louise de K. Lawrence.

56. The Avifauna of Bylot Island. Leslie M. Tuck and Louis Lemieux. 1959. *Dansk Ornithologisk Forenings Tidsskrift*. **53**(3): 137-154. (With Danish summary). A short description of the physiography and ecology of this large mountainous island off the north coast of Baffinland is followed by an annotated list of some 50 species of birds with the highlights of the authors' observations thereon. Tuck and Lemieux spent the summer of 1957 on the island, Tuck studying the large Murre colony, Lemieux concentrating on the Snow Geese. The annotated list contains a great deal of useful and reliable information on the species observed. In addition to the Murres and Snow Geese, the nesting data on almost all the other species observed are most welcome, as are the distributional notes from this area which has been so little studied.—O. L. Austin, Jr.

57. The Wood Sandpiper *(Tringa glareola* L.) as a Breeding Bird in Denmark. (Tinksmeden *(Tringa glareola* L.) som ynglefugl i Danmark.) Ernst Torp Pedersen. 1959. *Dansk Ornithologisk Forenings Tidsskrift*, **53**(2): 53-83. (From the English summary). This distributional study of the Wood Sandpiper at the extreme western end of its trans-Palearctic breeding range shows "the Danish breeding population numbers between 200 and 300 pairs distributed over about 50 localities . . . In many of the localities there are only one or two breeding pairs, and in many of these places the population, unfortunately is strongly threatened." A century or so ago the Wood Sandpiper was far more plentiful on the then more extensive heather moors of Denmark. The population shows some yearly variation which seems to be related to the amount of rainfall. In dry summers the birds leave when the ponds and lakes in the moors dry up, but return in following years when conditions are more propitious. The steady decline over the past century, which has been most manifest during the past 30 years, is attributed to "The intensive cultivation and draining of the moors in the latter half of the last century."—O. L. Austin, Jr.

58. Evening Grosbeak Records in the Maritimes, New England and New York/Summer of 1958. Mary S. Shaub. 1959. *Maine Field Naturalist*, **15**: 102-106. Detailed reports of observations from central New York through northern New England and in the Maritime Provinces. No less than 53 localities reported the species in June, July, or August, appreciably more than in previous years. Mrs. Shaub is interested in data even for localities where the species has become regular in summer in recent years, for purposes of comparison.— E. Alexander Bergstrom.

59. Winter Habitat Preferences of White-crowned Sparrows. L. Richard Mewaldt and Ernest B. Woon. 1959. *News from the Bird-Banders*, **34**: 1-4. At 15 sites near San Jose, Calif., White-crowned Sparrows (Zonotrichia leucophrys) were banded between October 5, 1957 and November 11, 1958. Of these, 238 were identified as *Z.l. gambelii*, 523 were identified as *pugetensis*, and 43 as *nuttalli*. While the population of the species at any one site tended to have one or the other of the two more abundant races predominating, the authors were unable to detect a habitat preference for either race.—E. Alexander Bergstrom.

SYSTEMATICS

60. Basic Systematics and Ornithogeography. R. Verheyen. 1959. *Le Gerfaut*, **49**(1): 95-101. In further developing his theory of paramorphogenesis (see *Bird-Banding* **30**: 60-61) the author proposes that the systematic relationships of birds be determined not by the considered judgment of their similarities and differences by individual scholars, but by a strictly mathematical evaluation of

all their various characters, morphological, anatomical, and ethological. Those that share 90 percent or more total taxonomic characters he would place in the same genus, those with 70 percent to the same family, with 50 percent to the same order, and so forth. How nice it would be if systematic evaluations could thus be brought into the realm of the exact sciences! One could feed a list of characters into a computer and let the machine give us all the answers.

One basic weakness in Verheyen's system is the impossibility of assigning relative mathematical values to taxonomic characters. Just how much more (or less) important taxonomically, for instance, are color and pattern than the number of primaries or rectrices, or palate structure, or type of courtship or head-scratching? This fault is not remedied by giving equal weight to each and every character, as he proposes. In addition Verheyen fails to acknowledge that the species, and to a lesser extent the subspecies, are the only "natural" taxonomic categories, that all the higher categories are still little better than groupings of convenience manufactured by man. Though I agree that "systematics ought to express relationships, which is only possible within groups of related species," I cannot see that this system would make the genus "the theoretical and practical basic unit in systematics and not the species," or that so doing would accomplish anything.—O. L. Austin, Jr.

FOOD

(See also Numbers 49, 53)

61. Some data on the diet of Black Redstart. (Quelques données bromatologiques sur le Rougequeue noir [*Phoenicurus ochruros gibraltariensis*]). Christian Erard. 1959. *Nos Oiseaux*, **25**: 13-16. Data obtained in part from observation of feeding habits and in part from stomach dissections are presented under the headings insects, other animal food, and vegetable food. Many of the food items are identified to species. No breakdown to percentages of various classes is given.—R. O. Bender.

SONG

(See also Number 41)

62. Family Tradition in Song Development of the Bullfinch. (Familientradition in der Gesangsentwicklung des Gimpels *(Pyrrhula pyrrhula* L.).) Jürgen Nicolai. 1959. *Journal für Ornithologie*, **100** (1): 39-46. Young male Bullfinches raised in captivity learn their songs from their fathers; at the age of 7 weeks they concentrate on their fathers' songs with intent expressions and heads held obliquely. At the same time their early sexual behavior develops; the young males react like females to their fathers. Examples are given of particular songs being transmitted in one family to sons, and in another to sons, grandsons and great-grandsons. Spectrograms are shown of similar motifs in songs of father and son as well as a sample of the very simple song of a wild Bullfinch.

In a great many species of small passerines the young scatter at about 4 weeks of age. With Song Sparrows *(Melospiza melodia)* I found (1913:149) that "the possession of similar songs is no proof of close relationship between the singers, as neither brothers, fathers and sons, or grandfathers and grandsons, have had similar songs, while, on the other hand, birds known to be unrelated have shown this phenomenon. Particular songs were neither inherited nor learned during the first 4 weeks." One hand-raised bird learned his songs at the age of 3 months. —M. M. Nice.

63. A Field Guide to Bird Songs of Eastern and Central North America. Recorded by the Laboratory of Ornithology, Cornell University, under the direction of Peter Paul Kellogg and Arthur A. Allen, in collaboration with Roger Tory Peterson. 1959. Houghton-Mifflin Co., Boston. Album of two 12″ records, 33 1/3 r.p.m., $10.00.

Each song is accompanied by a page reference to the current (1947) edition of Peterson's [Eastern] *Field Guide to the Birds*. However, while this is the most useful comparison, the records can readily be used with any other guide

in the current checklist order. The names follow the 4th A.O.U. *Checklist* rather than the 5th (so as to correspond to the field guide itself), but the album back shows the latest names as well. The album even includes an alphabetic index, as an aid to beginners.

The sound quality is generally high, comparable to other Cornell releases. To my ear, the record was least successful in the very high frequencies (which have always been recognized as the most difficult to record). The Blackpoll Warbler, in particular, came through poorly, perhaps by selection of an unusually weak or high song. By comparison, it was much less audible than any of the three Blackpolls on the Ontario record (*Songs of Warblers of Eastern North America*, see review in *Bird-Banding*, **29**: 261).

The album includes such rare species as Whooping Crane, Everglades Kite and Ivory-billed Woodpecker. It includes the one eastern warbler—Bachman's—omitted from the Ontario record (not considering the problematical Sutton's). In comparison with other records, it has a greater variety of waterbirds and shorebirds. While it may be unkind to look for more after such an abundance, the album does devote space to a number of songs of only limited value for field identification, while omitting some species where songs or calls are of major value: for example, Roseate Tern, Saw-whet Owl, Red Crossbill and Snow Bunting. No doubt even Cornell's wealth of recordings still has a few gaps. The Yellow Rail is represented by its second song, generally considered the source of William Brewster's mysterious "kicker" in eastern Massachusetts, rather than by the ticking notes considered typical of the species in its centers of abundance as a breeding bird in Canada.

The species given include many for which Peterson's *Field Guide* gives no description, or only a general one. The beginner can learn songs far quicker from the combination of record and book than by book alone. Even the most experienced field man is likely to find some songs here which he has not had the opportunity to hear in the field.

The inclusion of so many species in one album was accomplished partly by giving each only briefly. The album includes over 300 species, generally one individual and one song. By comparison, while the Ontario record (limited to warblers) has only 38 species, it is rich in examples—170 individuals, and 400 songs. Considering less specialized records, the three Stillwell releases (see *Bird-Banding*, **24**: 85-86; **25**: 170-171; and **28**: 183) also give a much better idea of the variety of songs within a single species.

The new album is a real bargain, considering the number of species listed. It takes first place as an album to be recommended as the start of a collection of bird songs, at least for eastern North America.—E. Alexander Bergstrom.

BOOKS

64. Complete Field Guide to American Wildlife: East, Central, and North. Henry Hill Collins, Jr. 1959. Harper and Brothers, Publishers, New York. 633 pages illustrated. Price $6.95. This latest addition to the plethora of guide books now on the market is most ambitious in scope. It covers "all species of birds, mammals, reptiles, amphibians, food and game fishes, sea shells, and the principal marine invertebrates occurring annually in North America east of the Rockies and north of the 37th parallel." Describing some 1400 species adequately within the limited size of a pocket book as this one does is no mean achievement. The volume is almost twice as thick as the Houghton-Mifflin series of guides, but identical in other dimensions. While a trifle bulky to carry in a side or hip pocket, it will fit neatly into a small haversack and is an ideal size for carrying in a car glove compartment. It is a fine handy little book for the bird watcher who would like to know the correct identification of the many other interesting biota he encounters in his rambles afield.

The book presents a number of innovations. One is the small range maps which show the general distribution of each species quickly, clearly, and in less space than words. Another is a series of comparison charts listing the pertinent identification marks for groups of similar birds, which strike me as particularly ingenious and useful. Another novelty in this country, which I first saw in a Japanese bird guide published some 30 years ago, is the picturing of each species' egg with the bird.

The text is exceptionally well done, both in arrangement, in coverage, and in style. The presentation is clear and fresh, the writing professionally polished. The author's researching is sound and shows a good knowledge of his subject, particularly in the birds, and he has successfully achieved a combination of the best features of the Peterson and Audubon guides, and added quite a bit of new material of his own.

The best I can say of the bird plates by Russell Francis Peterson (no kin) is that they are adequate. The birds in the color plates are stiff, wooden, and have a decoy-like aspect. The color reproduction is only fair. The color plates of the reptiles and amphibians, the fishes, and the invertebrates are far superior in every way to those of the birds.—O. L. Austin, Jr.

65. The Bird World of the South Caspian Lowlands. (Die Vogelwelt des Südkaspischen Tieflandes.) Ernst Schüz. 1959. Schweizerbart'sche Verlagsbuchhandlung. Stuttgart. 199pp. In the past the Caspian Sea was a wonderful refuge for water birds and a spectacular place to watch migration. After tracing the history of ornithological observation in this region, starting with Gmelin in 1770, Dr. Schüz tells of his own experiences there from February to May 1956. Most of the book is devoted to an annotated list of 327 species (210 of which nest) in the region between the south coast of the Caspian Sea and the Elburz Mountains. Ecology is discussed, as well as the migration picture, and the dangers confronting the birds, these dangers stemming almost entirely from human activities. The fall in the level of the Caspian Sea benefits only the flamingos, for they prefer shallow, very salty water. Oil on the water and the beaches takes a heavy toll, as does irresponsible killing of the birds. Dr. Schüz stresses the great and pressing need for education of the people in respect to wildlife and for the establishment of nature reserves. An interesting, thorough piece of work.—M. M. Nice.

66. The Birds of the Saskatchewan River, Carlton to Cumberland. C. Stuart Houston and Maurice G. Street. 1959. *Spec. Publ. No. 2, Sask. Nat. Hist. Soc.*: 1-205. This well-annotated list of a limited area in central Saskatchewan contains 259 species, plus 7 hypotheticals which appear in proper order but not in boldface. It adds Barred Owl to the Saskatchewan list and to the hypothetical list Greater Scaup, Eskimo Curlew, Little Gull, and Pine Warbler. In Nipawin alone breeding evidence is presented for 141 of the 241 species on the local list. The introductory material includes 17 pages of history and biography, 7 pages of description of the area, and 2 pages of banding summary. The AOU Check-List is followed faithfully, and binomials are used except in a few cases where subspecifically-identified specimens are cited. Each species account includes its status in each of five areas along the river, numbers of individuals recorded—concrete evidence of past and present abundance—egg dates, notes on nest material, food, habitat, and banding totals with recoveries and returns from these birds. Among the fascinating distribution items is the fact that, although the region is on Mountain Time and lies between the 101st and 104th meridians, Eastern Kingbird, Eastern Phoebe, and Rose-breasted Grosbeak are more common than their western counterparts, while Baltimore Oriole completely supplants Bullock's. Especially interesting to me were the accounts of the White Pelican, Trumpeter Swan, Canada Goose, Sharp-tailed Grouse, Whooping Crane, Forster's Tern, and Common Raven.—Thomas A. Imhof.

NEBBA FINANCIAL STATEMENTS, 1958

The general account reflects a continuation of long issues of *Bird-Banding*, at the new, higher printing costs. Despite a further increase in income from dues and subscriptions, the operating deficit was greater than for the previous year. We expect slight reductions in the length of issues. Any reader who can persuade a friend to become a member will help us greatly in efforts to continue long issues.

The disbursement of $265 from the Research Fund supported tern banding on Cape Cod (Massachusetts), on a small scale. For the 1960 season, we hope that a worthwhile program can be carried on with volunteer help, in June and early July. Anyone in a position to help is invited to get in touch with Dr. W. H. Drury, Jr., Drumlin Farm, So. Lincoln, Mass.

The NORS figures cover most of the second year of operation on Nantucket. The station was operated much longer than in 1958, and we plan another long season in 1960.

The net account did well again. Because of a further increase in demand for nets, these funds are just adequate to cover the needs of the business, with up to eight shipments on order at a time. Requests for information on prices and availability of nets should be directed to Mr. E. A. Bergstrom, 37 Old Brook Road, West Hartford 17, Conn. (because of a planned trip, it is likely that no shipments can be made or inquiries answered between June 20 and July 30, 1960).

This year we have included a brief summary of assets and liabilities of all the accounts. This can be misleading, as it lumps together funds for permanent or long-term projects with those for current expenses or short-term projects. However, the second subtotal under "Liabilities" does give some idea of the NEBBA's total funds, apart from such current obligations as subscriptions or nets paid in advance, accounts payable, or loans.

NORTHEASTERN BIRD-BANDING ASSOCIATION

Income Statement

	Year ending Oct. 31	
Receipts	*1958**	*1959*
Subscriptions and dues (current year)	$2,578.00	$2,798.07
Sale of back issues	36.75	84.48
Contributions	101.00	
Interest	66.95	71.86
	$2,782.70	$2,954.41
Expenses		
Printing of Bird-Banding	$2,762.07	$2,853.60
Mailing of Bird-Banding	237.15	339.08
Other printing, stationery, postage etc.	151.43	243.57
Massachusetts Conservation Council (donation)	10.00	10.00
North American Council of Bird-Banding Associations		20.00
Bank charges and miscellaneous	6.72	3.63
	$3,167.37	$3,469.88
Net Loss	$ 384.67	$ 515.47

Balance Sheet

Assets		
Cash	$4,174.18	$3,775.90
Back issues of *Bird-Banding*	1.00	1.00
Accounts receivable	36.00	17.25
	$4,211.18	$3,794.15
Liabilities and Net Worth		
Reserve for fourth quarter	$ 634.31	$ 676.75
Subscriptions paid in advance	133.50	193.25
Reserve for index fund	1,300.40	1,310.40
Reserve for research fund		5.00
Life membership fund	500.00	500.00
Net Worth	1,642.97	1,108.75
	$4,211.18	$3,794.15

Index Fund		
Reserve	$1,450.00	$1,300.40
Disbursements	149.60	
Contributions		10.00
	$1,300.40	$1,310.40
Research Fund		
Contributions		$ 270.00
Disbursements		265.00
		$ 5.00
Life Membership Fund	$ 500.00	$ 500.00

Mrs. James R. Downs, Treasurer

*Revised

	1959	*1958*
Index Fund		
Reserve	$1,300.40	$1,450.00
Contributions	10.00	
Disbursements		149.60
Net Reserve	$1,310.40	$1,300.40
Life Membership Fund	$ 500.00	$ 500.00
Research Fund		
Received	$ 270.00	
Disbursed	265.00	
Net Reserve	$ 5.00	

NANTUCKET ORNITHOLOGICAL RESEARCH STATION—1959

Receipts	
Balance forward January 1, 1959	$2,789.61
Net Account (transmittal for insurance)	19.50
Donation	5,000.00
Savings Bank Interest	115.54
Federal Income Taxes withheld	403.16
Social Security Taxes withheld	113.96
Total	$8,441.77
Expenses	
Salaries	$4,358.33
Travel Expense	315.00
Income Taxes withheld	403.16
Social Security Taxes	222.92
Insurance	160.16
Supplies and Equipment	148.85
Bank charges	1.03
Telephone tolls	.90
Balance forward December 31, 1959	2,831.42
Total	$8,441.77

John H. Conkey, Assistant Treasurer

MIST NET ACCOUNT — 1959

Profit and Loss Sheet

	1958	1959
Receipts (sale of nets)	$2,392.93	$2,871.93
Expenses		
Cost of nets, postage, customs	2,475.52	2,323.38
Miscellaneous	86.23	82.50
Paid on loans	257.45	300.00
Total	$2,819.20	$2,705.88
Net Operating Profit	$ 365.62	$ 498.55

Balance Sheet

Assets		
Cash	$ 327.87	$ 370.81
Accounts receivable	178.61	335.92
Nets on hand (at cost to date)	633.23	215.10
Nets on order (at cost to date)	402.50	805.00
Other	7.00	10.00
Total	$1,549.21	$1,736.83
Liabilities		
Nets paid in advance	$ 14.75	$ 3.82
Loans	300.00	—
Reserve for customs duties	—	300.00
Reserve for contingencies	300.00	300.00
Surplus	934.46	1,133.01
Total	$1,549.21	$1,736.83

CONSOLIDATED BALANCE SHEET

Assets	1958	1959
General (incl. life membership, index, research)	$4,211.18	$3,794.15
NORS	2,789.61	2,831.42
Net account	1,549.21	1,736.83
Total	$8,550.00	$8,362.40
Liabilities		
Paid in advance, accounts payable, loans		
General	$ 767.81	$ 870.00
NORS	—	—
Net account	314.75	3.82
Subtotal	$1,082.56	$ 873.82
Other		
General	$3,443.37	$2,924.15
NORS	2,789.61	2,831.42
Net account	1,234.46	1,733.01
Subtotal	$7,467.44	$7,488.58
Total	$8,550.00	$8,362.40

NOTES AND NEWS

Plastic wing gauges 6 inches (153mm.) long are now available from Parker C. Reed, 27 Hayes Ave., Lexington 73, Mass. Price: $1.00 each,, postpaid. These gauges are faster and more accurate than calipers, for wing measurements. This size is adequate for almost all Passerines.

We have had a number of inquiries for a good grade of plastic color band. Several users have expressed satisfaction with those made by A. C. Hughes (1 High St., Hampton Hill, Middlesex, England), which come in 12 plain colors and 72 combinations of stripes. Before using any color bands in the U. S., please be sure to clear with the Bird-Banding Office at Patuxent to avoid the chance of conflict with some other color-banding project.

Brooke Meanley reports a good start in 1959 on his cooperative project to band nestling Redwinged Blackbirds. Here is a chance for small-scale banding of nestlings by the individual bander to contribute significantly to an important project. Any bander in the eastern U. S. or eastern Canada who can band some nestling Redwings, and who has not received details by mail, can get them from Patuxent.

The A.O.U. will entertain applications for aid in ornithological research, from the Josselyn Van Tyne Memorial Fund, until June 1, 1960. Full details (in 10 duplicate copies) should be sent to the chairman of the Research Committee: Dr. S. Charles Kendeigh, Vivarium Building, University of Illinois, Wright and Healey Sts., Champaign, Ill.

The annual meeting of NEBBA will be held once again at Drumlin Farm in South Lincoln, Mass. (Nature Center building, Saturday, October 1, 10 a.m. to 4 p.m.). We expect a full program, and will welcome all members and friends.

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

Published quarterly for:

THE NORTHEASTERN BIRD-BANDING ASSOCIATION
THE EASTERN BIRD-BANDING ASSOCIATION
THE INLAND BIRD-BANDING ASSOCIATION

Applications for membership in these associations should be sent to their respective secretaries. The annual membership dues of $5 per year ($7 family membership, for adults) in the Northeastern Association include a subscription to *Bird-Banding*. Membership in the Eastern and Inland Associations is $2 each per year; members of those associations who wish to receive *Bird-Banding* may send $4 direct to the secretary-treasurer. Subscription price to non-members of the associations is $5 per year; single copy $1.25.

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